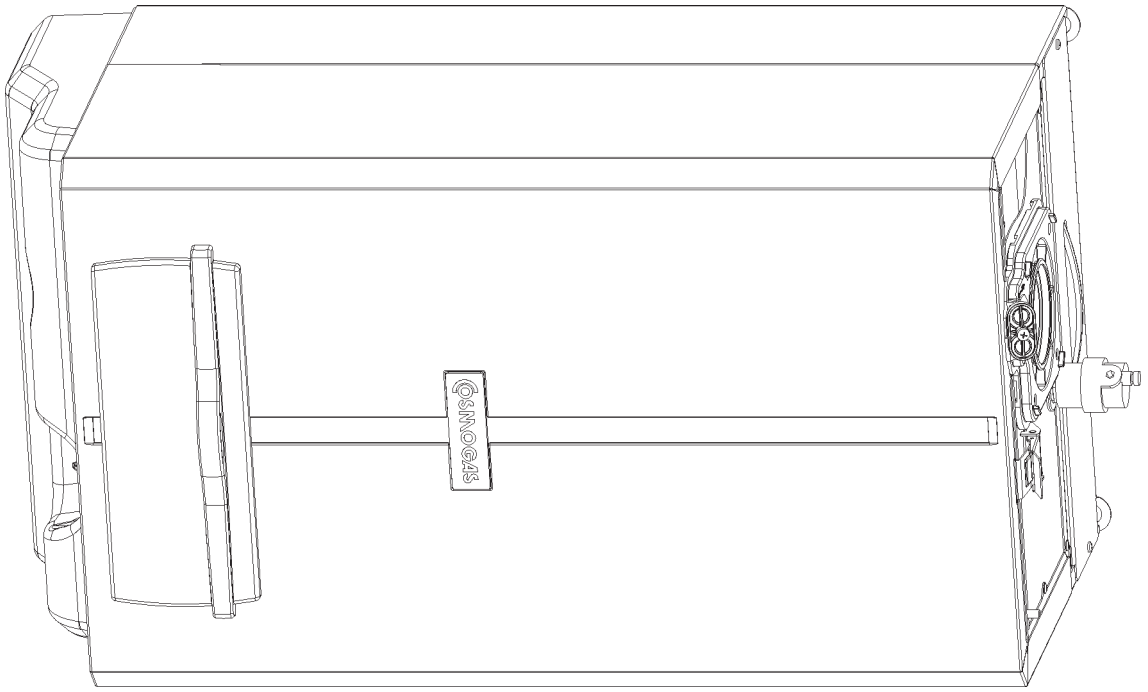
INSTRUCTION MANUAL FOR INSTALLATION AND MAINTENANCE OF GAS BOILERS

PLEASE READ THE MANUAL CAREFULLY: IT CONTAINS IMPORTANT INFORMATION REGARDING SAFETY, INSTALLATION, USE AND MAINTENANCE OF THE APPLIANCE

MODELES:

NOVADENS 24 - 24B
NOVADENS 24C - 24P
NOVADENS 34 - 34B
NOVADENS 34C - 34P



BOILERS

OSNOGAS®

62403425 - R00 07-12-2007_GB-IE

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1 - GENERAL SAFETY WARNINGS

If you smell gas
- Close the gas cock.
- Ventilate the room.
- Do not use any electrical appliances, telephone included.
- Immediately call a qualified technician or the gas board from another room or building. If you cannot contact them, call the Fire Brigade.

If you smell pruducts of the combustion
- Switch off the appliance.
- Ventilate the room.
- Call a qualified technician.

Installation, modifications

☞ The installation, setting and modification of the gas appliance must be carried out by qualified technicians, in compliance with local and national norms and these instructions.

☞ Never leave any packaging or replaced parts within the reach of children.

☞ Seal the setting devices after each setting.

☞ It is compulsory to connect the appliance's discharge pipe to a chimeney. Failure to observe this rule may seriously risk the safety of individuals and animals.

☞ Flue pipes must not be modified in any way.

☞ The user, in accordance with these instructions, must keep the appliance in satisfactory running order and ensure reliable, safe operating.

☞ The user is responsible for employing a qualified technician to carry out maintenance work on the appliance in compliance with local and national norms and the matters stated in this manual.

☞ We highly recommend arranging a regular maintenance contract with a qualified technician

☞ The manufacturer cannot be held responsible for any damage to people, animals or property caused by incorrect installation or inadequate maintenance.

☞ Use the switches to disconnect the appliance from the mains before carrying out any cleaning or maintenance operations.

☞ Do not obstruct the intake/discharge pipe ends.

Explosive or easily inflammable products
Do not store or use explosive or easily inflammable materials such as paper, solvents, paints, etc..., in the same room as the boiler.

In the event of a breakdown
In the event of breakdown and/or malfunctioning of the appliance, disconnect it, do not attempt to repair it or intervene in any way whatsoever. Contact a qualified technician. If repairs require parts to be replaced, only original spares must be used. Failure to observe the above may compromise the appliance's safety.

Qualified technicians
Qualified technicians are personnel with specific, technical training in the heating system component sector and with regards to domestic hot water production for public use, fuel gas systems and electrical systems. These individuals must have the legally required qualifications.

☞ This booklet forms an integral and essential part of the product and must be carefully kept by the user, for any future consultation. Ensure that this booklet is handed over to the new owners and/or installer if the appliance should change hands or be moved for any reason whatsoever.

☞ Any optional extras or kit fitted subsequently must be original Cosmogas spares.

☞ This appliance must only be used for the purpose it has been expressly designed for: heating water for closed circuit systems for centrally heating public and private buildings, producing sanitary and domestic hot water for civil use.

☞ The manufacturer cannot be held responsible, contractually or otherwise, for any damage caused by incorrect installation or use and for failure to comply with the manufacturer's instructions or applicable local and national legislation.

☞ For safety reasons and to safeguard the environment, all packaging must be disposed of in special sorted refuge collection centres.

1.1 - National installation legislation

The installation must be carried out by a registered competent person and be in accordance with the relevant requirements of the current GAS SAFETY (Installation and Use) REGULATIONS, the BUILDING REGULATIONS (Scotland)(Consolidation), the LOCAL BUILDING REGULATIONS, the current I.E.E. WIRING REGULATIONS and the bye laws of the LOCAL WATER UNDERTAKING. Where no specific instruction is given reference should be made to the relevant BRITISH STANDARD CODES OF PRACTICE. For Ireland install in accordance with IS 813 "INSTALLATION OF GAS APPLIANCES".

B.S. Codes of Practice

BS 6891 Gas Installation.
BS 5546 Installation of hot water supplies for domestic purposes.
BS 5449 Part 1 Forced circulation hot water systems.
BS 6798 Installation of gas fired hot water boilers.
BS 5440 Part 1 Flues.
BS 5440 Part 2 Ventilation.
BS 7074 Expansion vessels and ancillary equipment for sealed water systems.
BS 7593 Treatment of water in domestic hot water central heating systems.

2 - GENERAL INFORMATION

2.1 - Introduction

Congratulations!
You have effectively purchased one of the best products on the market.
Each single part is built, tested and assembled, with pride, at the COSMOGAS factories, thereby guaranteeing optimum quality control.
Thanks to on-going research carried out by COSMOGAS, this product has been conceived and is considered to be the best in its class with regards to respect for the environment, since it falls within class 5 (less polluting) envisaged by technical norm EN 297 (and EN 483) and has an elevated efficiency, 4 star as per EC Directive 92/42/CEE. Great importance is also given to the end of the appliance's useful life. All its components can easily be separated into similar and completely recyclable parts.

2.2 - Description of models

NOVADENS XXYYYY

" " = Boiler with exchanger sanitary to partial accumulation;
"A" = Boiler for only heating without integrated pump;
"B" = Boiler which can be combined with BWR C series storage tank;
"C" = Boiler for only heating with integrated pump;
"P" = Boiler with exchanger secondary for D.H.W., to plates;
"0834" = Boiler for low temperature central heating systems.

24 = Boiler with maximum input heat of 25 kW
34 = Boiler with maximum input heat of 34.8 kW

Gas-fired, condensing, hot water boiler, with sealed combustion chamber and pre-mix burner, for heating and domestic hot water production.

2.3 - Manufacturer

COSMOGAS srl
Via L. da Vinci 16
47014 - Meldola (FC) ITALY
Tel. +39 0543 498383
Fax. +39 0543 498393
www.cosmogas.com
info@cosmogas.com

2.4 - Key to symbols used

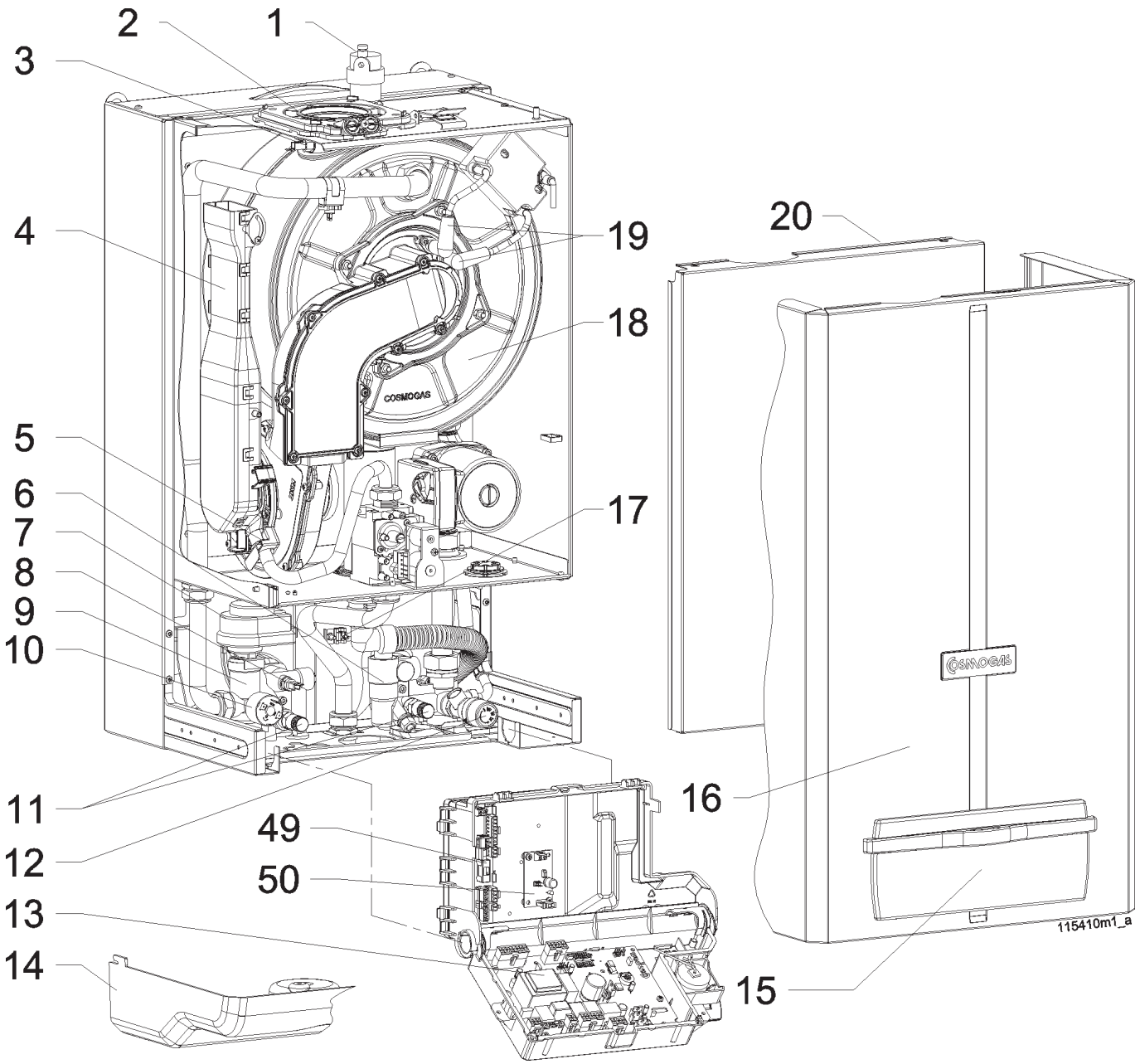
CAUTION!!!
Risk of electric shock: failure to observe this warning may compromise the smooth running of the appliance or cause serious damage to individuals, animals or property.

General danger!
Failure to observe this warning may compromise the smooth running of the appliance or cause serious damage to individuals, animals or property.

- Operation symbol

☞ Important indication symbol

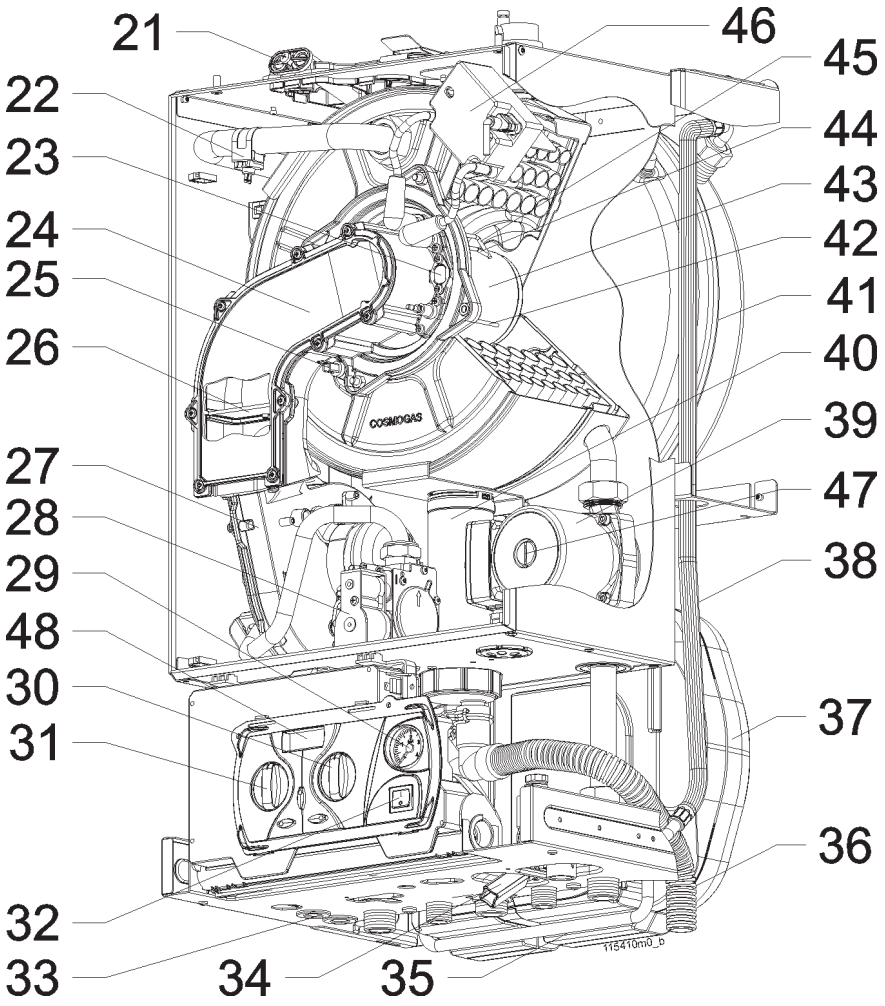
3 - MAIN COMPONENTS



1 - Automatic air vent
2 - Air intake and flue gas discharge fitting (venting system)
3 - NTC7 flue gas sensor
4 - Air drum
5 - Air/gas mixer
6 - Return unit
7 - 3 way valve
8 - NTC2 d.h.w. outlet sensor
9 - 3 way valve shell
10 - Heating pressure switch
11 - Heating circuit discharge cock
12 - Safety relief valve
13 - Control board
14 - Lower cover
15 - Door to control box
16 - Casing
17 - NTC3 d.c.w. sensor
18 - Primary heat exchanger
19 - Ignition cables
20 - Door of sealed combustion chamber

Figure 1 - Internal components of boiler

3 - MAIN COMPONENTS



21 - Combustion analysis tap
22 - NTC1 boiler temperature sensor
23 - Burner window
24 - Air/gas manifold
25 - NTC6 high temperature limit sensor
26 - Flue gas flow back prevention valve
27 - Fan
28 - Gas valve
29 - Pressure gauge
30 - Domestic hot water control
31 - Heating control
32 - On/off power switch
33 - Cable clamp
34 - Filling cock
35 - By-pass pipe (optional)
36 - Condensation discharge pipe
37 - Secondary heat exchanger for domestic hot water
38 - Expansion tank connection pipe
39 - Circulator pump
40 - Condensation discharge trap
41 - Expansion tank
42 - Ionization electrode
43 - Burner
44 - Right ignition electrode
45 - Left ignition electrode
46 - Spark generator
47 - Screw cap for unblocking pump
48 - Display
49 - Electric connections board
50 - Opentherm interface board (optional)

Figure 1 - Internal components of boiler

4 - FUNCTIONS OF THE APPLIANCE

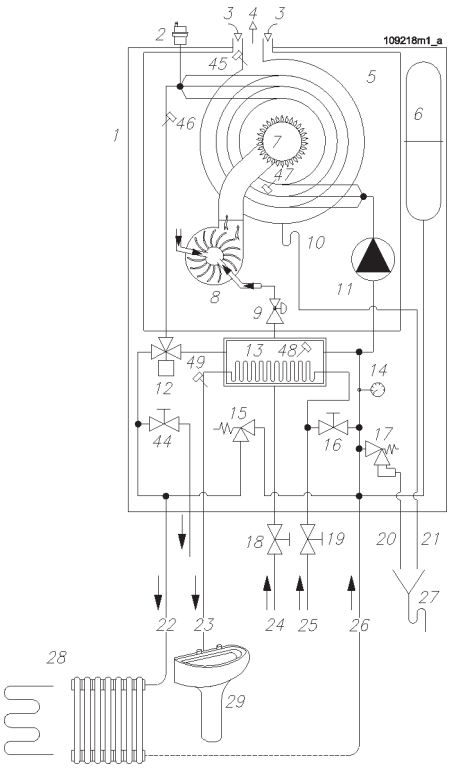


Figure 2 - Hydraulic diagram
NOVADENS 24 or 24P
NOVADENS 34 or 34P

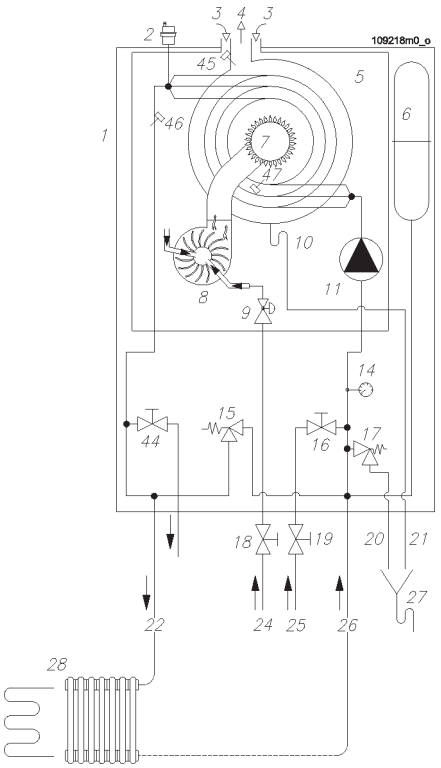


Figure 3 - Hydraulic diagram
NOVADENS 24C
NOVADENS 34C
(for settings, see section 5.5)

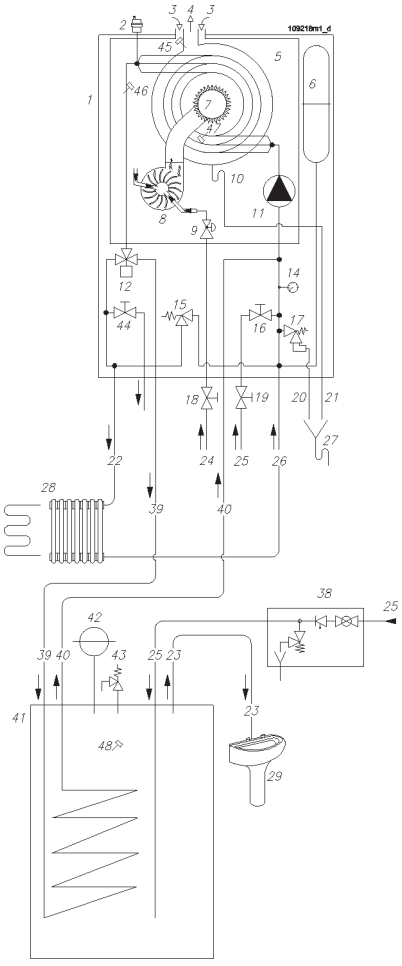


Figure 4 - Hydraulic diagram
NOVADENS 24B
NOVADENS 34B

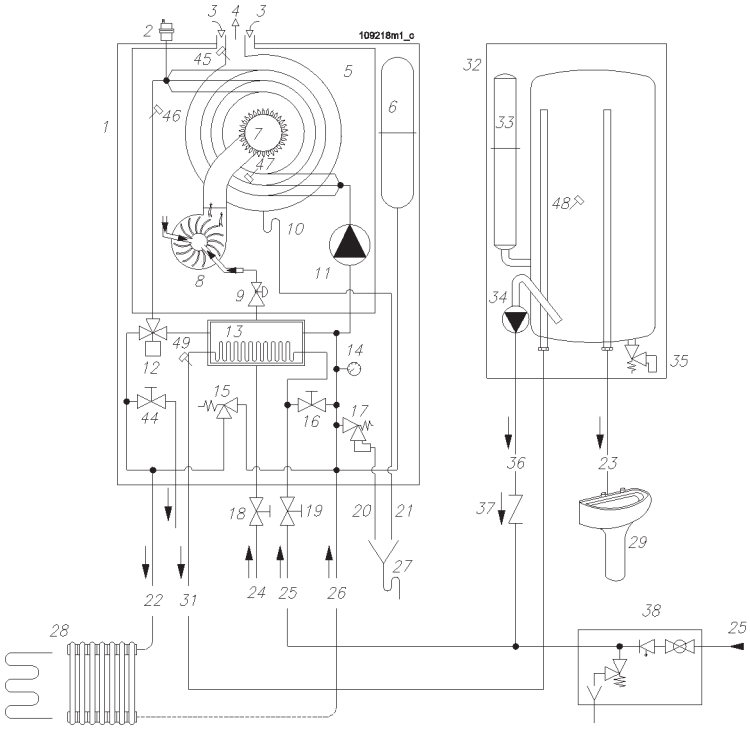


Figure 5 - Hydraulic diagram
NOVADENS 24 or 24P
NOVADENS 34 or 34P
connected to B70 type storage tank
(for settings, see section 5.15)

4 - FUNCTIONS OF THE APPLIANCE

Key to figures 2, 3, 4 and 5:
1 = COSMOGAS boiler NOVADENS model
2 = automatic air vent
3 = air intake
4 = flue discharge
5 = sealed combustion chamber
6 = expansion tank
7 = burner
8 = fan
9 = gas valve
10 = condensation discharge trap
11 = circulator pump
12 = 3-way valve
13 = secondary heat exchanger for d.h.w.
14 = pressure gauge
15 = by-pass valve (optional)
16 = filling cock
17 = safety relief valve
18 = gas cock
19 = cold water inlet cock
20 = safety relief valve discharge (optional)
21 = condensation discharge
22 = heating supply pipe
23 = domestic hot water outlet
24 = gas inlet
25 = cold water inlet
26 = heating return pipe
27 = trap funnel (optional)
28 = heating system for radiators or radiant panel-type heating system (to be fitted by installer)
29 = domestic hot water system (to be fitted by installer)
30 = ----------
31 = re-circulation supply pipe for water heater loading (to be fitted by installer)
32 = B70 type storage tank (optional)
33 = expansion tank
34 = circulator pump
35 = safety rilief valve
36 = re-circulation return pipe for water heater loading (to be fitted by installer)
37 = check valve (to be fitted by installer)
38 = hydraulic safety unit complying with EN 1487 (to be fitted by installer)
39 = water heater filling supply pipe (to be fitted by installer)
40 = water heater filling return pipe (to be fitted by installer)
41 = BWR type storage tank (optional)
42 = expansion tank
43 = safety relief valve
44 = heating system discharge cock
45 = NTC7 = flue gas sensor
46 = NTC1 = boiler temperature sensor
47 = NTC6 = high temperature limit sensor
48 = NTC3 = domestic cold water sensor/storage tank sensor
49 = NTC2 = domestic hot water outlet sensor

4 - FUNCTIONS OF THE APPLIANCE

4.1 - Intended use and functions of the appliance

This condensation-type gas appliance, is designed to be used for central heating and producing domestic hot water for civil use.
Fit the boiler to the system according to the most suitable residual curve head (see figures 6 and 7).
The maximum output heat is always guaranteed for the production of domestic hot water since, on each request, the heating service switches off.
Follow the specific procedure in section 9.13 for the adjustment of the domestic hot water temperature.
Depending on the model chosen, the following system types can be created:

A- NOVADENS -- ” “. By means of this boiler, a system can be created for the production of instant domestic hot water and a heating system with heating elements functioning at temperatures ranging between 30°C and 80°C. An example of this type of system is shown in figure 2.

B- NOVADENS -- “B”. By means of this boiler, a system can be created for the production of domestic hot water using a storage tank, BWR or equivalent model and a heating system with heating elements functioning at temperatures ranging between 30°C and 80°C. An example of this type of system is shown in figure 4.

C- NOVADENS -- “C”. By means of this boiler, a system can be created for the only heating with heating elements functioning at temperatures ranging between 30°C and 80°C. An example of this type of system is shown in figure 3.
In this model is moreover possible to connect, also after the installation, en storage tank model BWR filled up through one external valve to the boiler.

D- NOVADENS -- “P”. By means of this boiler, a system can be created for the production of instant domestic hot water and a heating system with heating elements functioning at temperatures ranging between 30°C and 80°C. An example of this type of system is shown in figure 2.

E- NOVADENS -- “0834”. By means of this boiler, a system can be created for the production of instant domestic hot water and a heating system with heating elements functioning at temperatures ranging between 20°C and 45°C. An example of this type of system is shown in figure 2.

F- NOVADENS -- “B0834”. By means of this boiler, a system can be created for the production of domestic hot water using a storage tank, BWR or equivalent model and a heating system with heating elements functioning at temperatures ranging between 20°C and 30°C. An example of this type of system is shown in figure 4.

G- NOVADENS -- “C0834”. By means of this boiler, a system can be created for the only heating with heating elements functioning at temperatures ranging between 20°C and 45°C. An example of this type of system is shown in figure 3.
In this model is moreover possible to connect, also after the installation, en storage tank model BWR filled up through one external valve to the boiler.

H- NOVADENS -- “P0834”. By means of this boiler, a system can be created for the production of instant domestic hot water and a heating system with heating elements functioning at temperatures ranging between 20°C and 45°C. An example of this type of system is shown in figure 2.

In all the boiler versions described previously, connection of the domestic hot water service is not indispensable; if the boiler is required solely for central heating purposes, it is sufficient to connect the cold water pipe so as to fill the heating system and close the fitting of the d.h.w. outlet.

All the NOVADENS -- or NOVADENS --0834 model boilers, can also be connected subsequently for the installation of a B70 C series storage tank (see figure 5)

All the boiler versions described previously can be connected to a room thermostat for the setting of the heating. Or, so as to improve the quality of the heating service, it is possible to connect an external temperature sensor (Climatic heat adjustment) so as to automatically set the supply temperature in relation to the external temperature; the room thermostat, in this case, can make a compensation of the room temperature. The room compensation can be of an ON /OFF type or two-stage.
For further information on the Climatic heat adjustment, refer to section 7.4.

- ☞ For take advantage of the rendering characteristics of boiler, it is advised to connect it to the CR04 cronothermostat, (see chapter 5.14.5), what it will regulate the temperature of supply to the radiators in continuous and linear way, to maintain the temperature environment planned.
- ☞ The boiler must be connected to a heating system and a domestic hot water supply, with compatible specifications, performance and power rating.
- ☞ Before installation, thoroughly flush the heating and plumbing systems of any residue or impurities which might compromise the smooth running of the boiler.
- ☞ This boiler is not designed for outside installation.
  Choose a sheltered place where it is protected from atmospheric elements including frost.
- ☞ Refer to figure 9 for minimum clearance distances for installation and future maintenance.

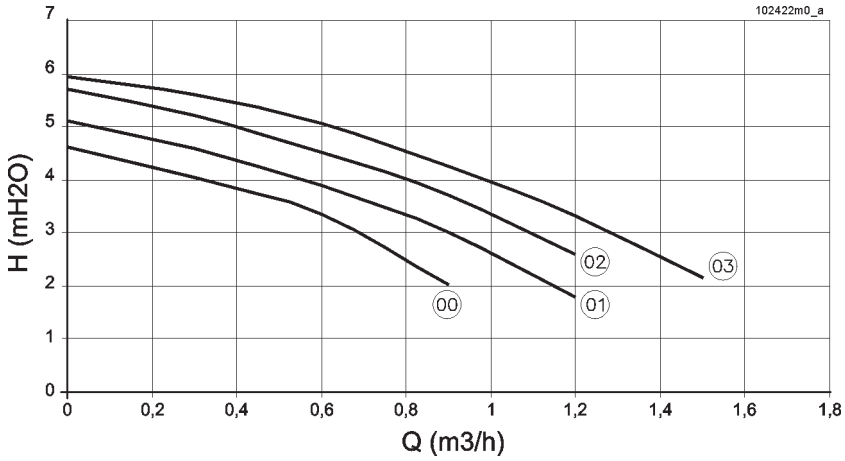


Figure 6 - Curve of the pump with 6 metres head

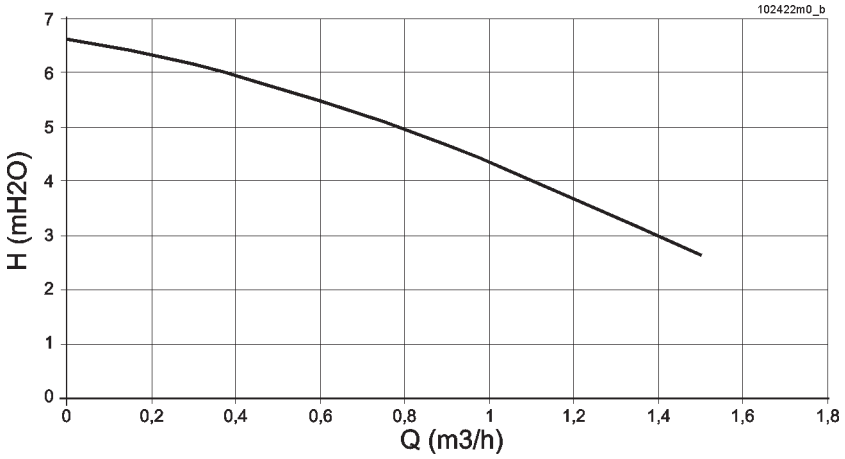


Figure 7 - Curve of the pump with 7 metres head

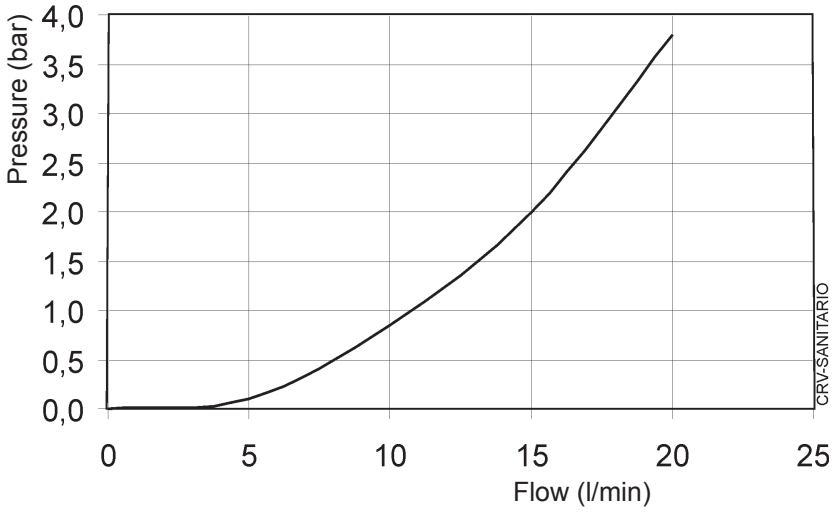


Figure 8 - Curve of the of pressure for the domestic side.

4.2 - Characteristic curves of heating system's residual head

Each standard boiler is fitted with its own specific circulator pump. The residual head at the boiler connections is shown in graph form in figures 6.
On demande, we can supply the boiler with a 7 m head pump (see fig.7).
The diagram comprises 4 curves which can be selected from the control panel, in the following manner:

- press the Reset button for 12 seconds until parameter U1 is displayed (the display panel will start to blinking);
- continually press and release the Reset button in order to scroll through the list of parameters until the PS parameter is displayed;
- once the parameter has been identified, it can be changed using the + or − key;
- choose the desired value of the pump speed;
- Press the Reset button in order to confirm the modified data and exit from the menu;

4.3 - Characteristic curve of the domestic side

Every boiler offers certain resistance to the passage of the domestic water (see graph flow/pressures of figure 8). The installer or the engineer must take account of this in order to ensure the correct domestic water flow to the utilities.

5 - INSTALLATION

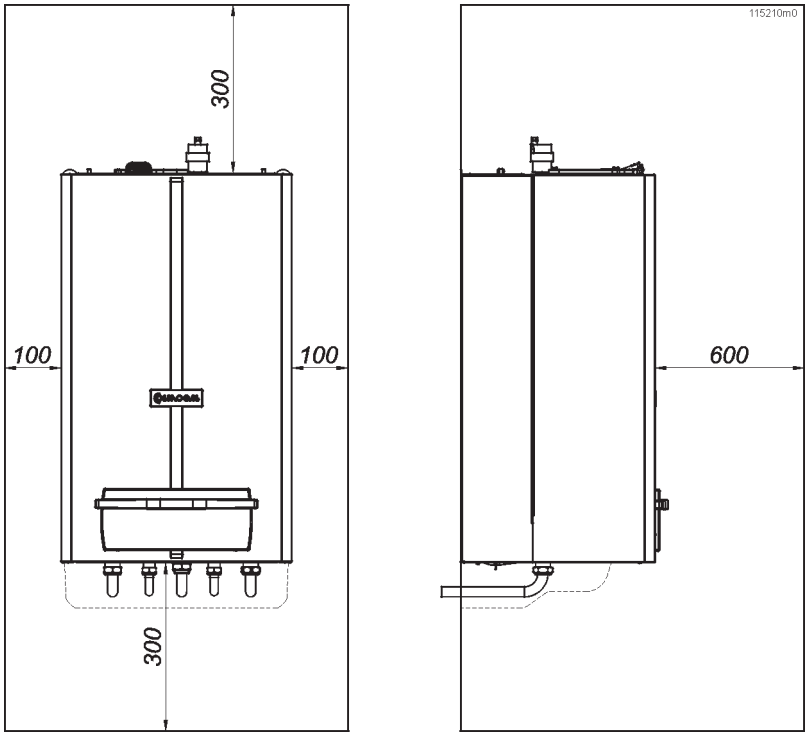
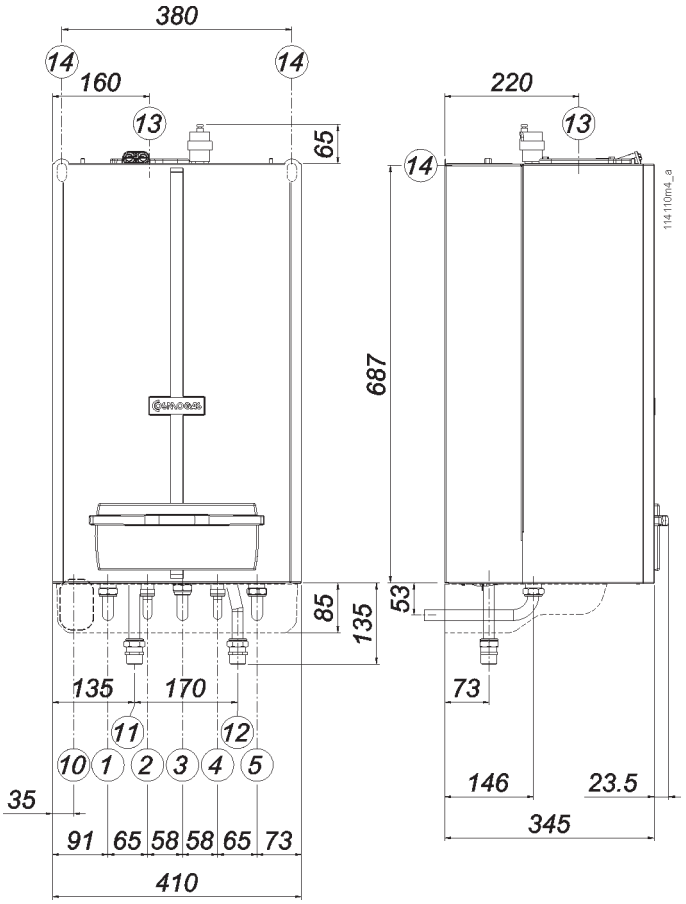


Figure 9 - Minimum clearance distances



1 = 3/4” (models 24) and
1” (models 34) heating supply
2 = 1/2” domestic hot water
(absent in NOVADENS B and C models)
3 = 3/4” gas
4 = 1/2” domestic cold water
5 = 3/4” (models 24) and 1” (models 34)
heating return
10 = area for power supply cable
11 = BWR supply pipe
(present only on NOVADENS B models)
12 = BWR return pipe
(present only on NOVADENS B models)
14 = positions available for boiler support

Figure 10 - Boiler dimensions and fittings’ distances

5.1 - Opening the packaging

The appliance is supplied in a box. Open it up following the instructions given on the closing flaps.

5.2 - Dimensions and clearances for installation

Leave an area free around the boiler for carrying out installation or maintenance activities, as shown in figure 9.

5.3 - Choosing the point of installation

CAUTION!!! The boiler must be installed exclusively on a solid, vertical wall able to bear its weight.
The appliance must be installed indoors, or protected from atmospheric agents including rain, wind, sun and especially frost.
When choosing the room and position for installation, account must be taken of the following factors:
- the connection of flue gas discharge/ air intake pipes;
- the connection of gas supply pipe;
- the connection to the water mains;
- connection of the system to the central heating;
- the connection to the domestic hot water system;
- electrical connections;
- the connection of the discharge for condensation produced by the boiler;
- electrical connection to the room thermostat;
- possible connection of the safety relief valve discharge;
- possible connection of the external temperature sensor;

5.4 - Supply and return

CAUTION!!! This boiler is equipped with a safety relief valve set at 3 bar. Therefore it must not be installed with a radiator positioned at a manometric high higher than 30 m.

CAUTION!!! COSMOGAS cannot be held responsible for any damage caused by incorrect use of additives in the heating system.

CAUTION!!! The system downstream from the appliance must be made of materials which can withstand temperatures up to 97°C. Otherwise (e.g. plastic piping) the boiler must be fitted with a device to cut out the pump when it reaches the maximum permitted temperature.

Thoroughly wash out the system, before connecting the heating pipes, to flush out any deposits (hemp, radiator casting residue, etc.) which might damage the appliance. Thorough flushing is also required when replacing an appliance.
Figure 10 illustrates the position of the supply and return pipes.

☞ Install a metallic mesh filter on the return pipe to prevent any residue from the system returning to the boiler.

☞ Do not use the appliance for adding any type of additive to the system.

5.5 - Radiant panel systems (or low temperature systems)

CAUTION!!! When the boiler is installed in a low temperature system, it is indispensable to set the switch 6 in the ON position (see chapter 7.5).
By means of this setting, the boiler will set the temperature towards the supply of a temperature between 20°C and 45°C. No setting operation from the control panel (even by means of the climatic setting) will be able to supply water at a temperature higher than 45°C.

CAUTION!!! If the boiler is installed in a radiant panel heating system with plastic piping, precautions must be taken against corrosion caused by water oxygenation: check that the system has plastic piping with a permeability to oxygen of no higher than 0.1 g/m3 at 40°C. If the piping does not comply with these specifications, the radiant panel circuit must be isolated from the boiler by a plate heat exchanger.

5.6 - Domestic hot and cold water

CAUTION!!! If the water hardness is greater than 25°F, we recommend installing a softener with filter (see section 5.13).
Figure 10 illustrates the positioning of the domestic hot and cold water pipes.
For servicing purposes, install a cut-off cock upstream from the cold water inlet.
Connection of the domestic hot water service is not indispensable; if the boiler is required solely for central heating purposes, it is sufficient to connect the cold water pipe so as to fill the heating system and close the d.h.w. outlet.

5.7 - Gas supply

CAUTION!!! It is forbidden to use a different gas to that stated for the boiler.

CAUTION!!! Check that the gas type and the pressure of the gas supplied correspond with those required for the boiler.
There are two possible situations:
A - the gas type and the supply pressure match those of the boiler setting. In this case proceed with connections;
B - the gas type and the supply pressure do not match those of the boiler setting. In this case, the boiler must be converted to the type of gas and supply pressure available.
A special conversion kit is available on request from your salesman or direct from COSMOGAS.

☞ Before installation, we recommend thorough flushing of the gas supply pipe.

☞ An on-off cock must be installed on the gas supply pipe.

☞ To avoid damaging the gas control unit of the appliance, carry out a leak test at a pressure of no greater than 50 mbar.

☞ If testing of the gas system must be carried out at a pressure nigher than 50 mbar, use the cock situated immediately upstream from the boiler, to isolate the same from the system.

Figure 10 shows the position of the appliance gas fitting.
The sections of piping making up the gas supply system must always provide sufficient gas to cover the required maximum.

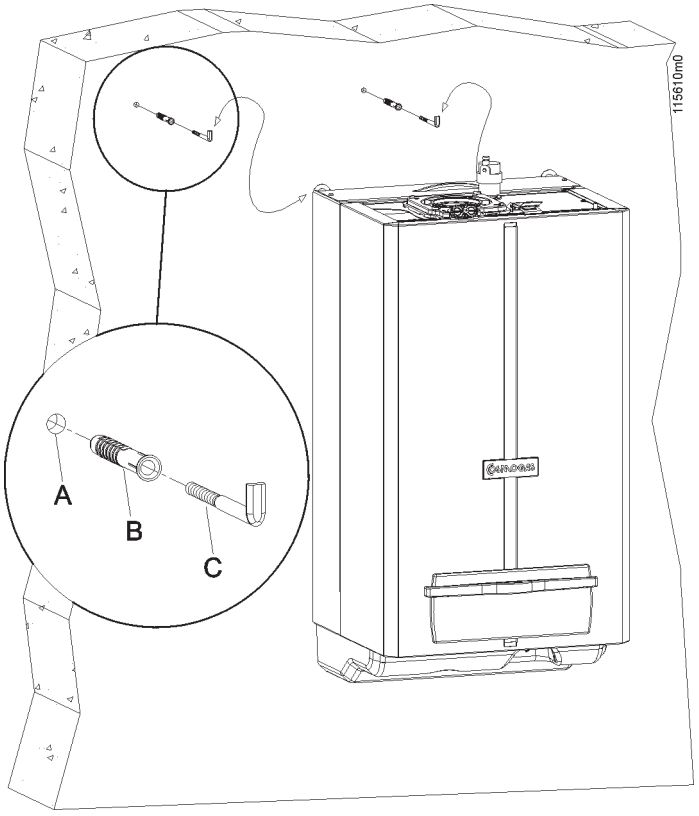


Figure 11 - Support dowel plugs

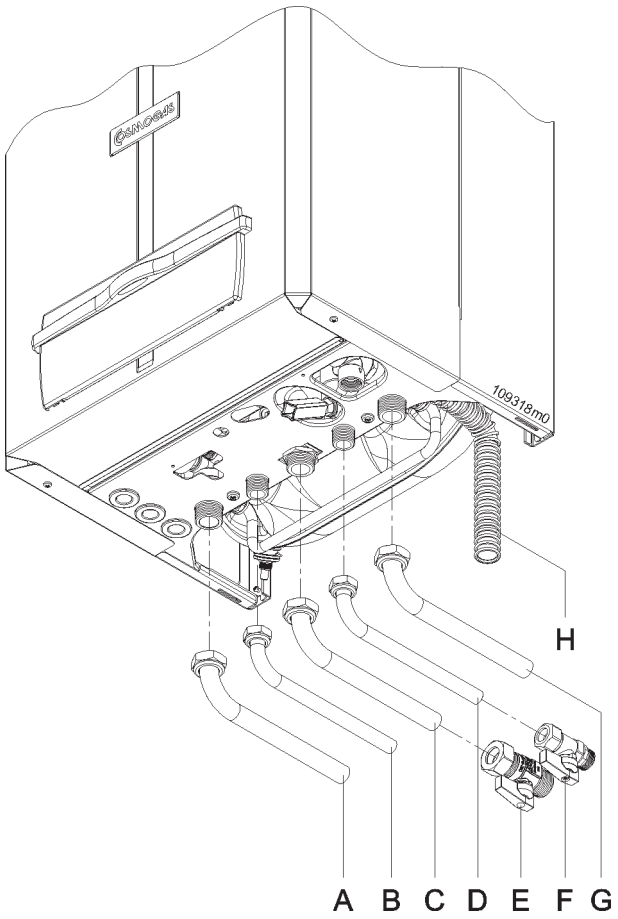


Figure 12 - Gas and water connections

5.8 - Assembling the appliance

Refer to figure 11:

- place the paper template, provided with the appliance, against the wall;
- ensure that the template is square with the room;
- mark holes for the wall dowel plugs and the hydraulic fittings;
- remove the paper template;
- drill the holes “A” and insert the wall dowel plugs “B”;
- carry out the hydraulic and gas connections for the boiler;
- hang the boiler on the dowel plugs “C”;
- carry out the hydraulic connections.

5.9 - Gas and water connections

The boiler comes supplied with the standard fittings illustrated in figure 12, where:

A = heating supply
B = domestic hot water
C = gas inlet
D = domestic cold water
E = gas inlet cock (EN 331 type approved)
F = domestic cold water cock
G = heating return
H = condensation discharge pipe

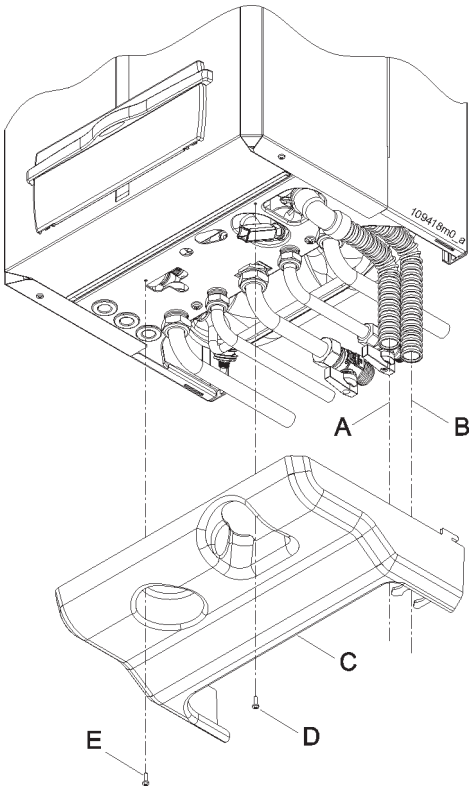


Figure 13 - Connection of the discharge safety valve “A” (pipe “A” is optional) and condensation discharge “B”

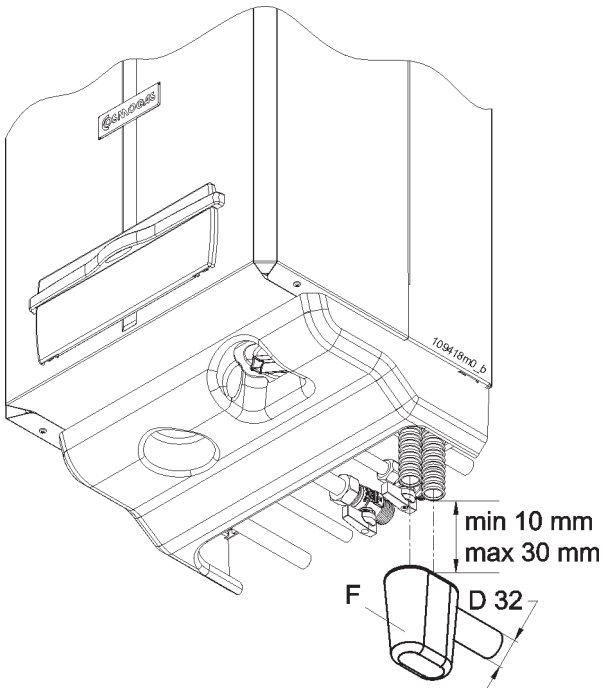


Figure 14 - Trap funnel “F” (on request)

5.10 - Condensation discharge

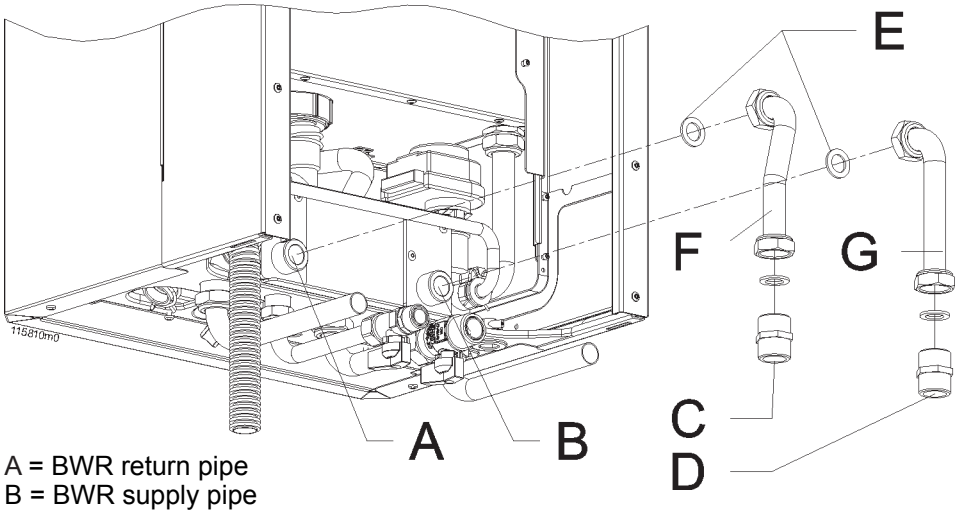
The boiler is equipped internally with a trap for the evacuation of condensation (see figure 1, detail 40) and so as to prevent the leakage of combustion products, whose end corresponds with pipe “B” shown in figure 13. This end must be conveyed to another smell-control trap (figure 14, detail “F”) so as to prevent the return of bad smells in the room (the smell-control trap “F” is supplied upon request).
In particular, the condensation disposal system must:

- ☞ for premises used for dwelling purposes or office purposes with a number of occupants greater than 10, be connected to the domestic waste disposal system by means of an appropriate trap with separation capable of preventing the pressurization of the system and preventing the return of bad smells from the sewer (detail “F” of figure 14). If the premises for office use has a number of occupants less than 10, before connection with the domestic waste discharge, it is advisable to fit a condensation neutralizer (see section 10 for the acidity value of the condensation and the quantity);
- ☞ be carried out with a pipe with an internal diameter equal to or greater than 13 mm;
- ☞ be installed in such a way so as to avoid the freezing of the liquid, therefore take care with any external stretches; discharge into gutters or rain collectors is forbidden;
- ☞ present a continual slope towards the point of discharge; avoid high points, which could place the pipe under pressure;

5.11 - Safety relief valve

The boiler is protected against overpressure, by a safety relief valve set at 3 bar (see figure 1, detail 12).
The safety relief valve discharge must be connected to pipe “A” (see figure 13) with a minimum internal diameter of 13 mm; pipe “A” must then be led to the smell-control trap (detail “F” of figure 14). This discharge with trap must provide protection against overpressure in the event of the valve opening and must indicate to the user that this intervention has taken place.
Pipe “A” shown in figure 13 and the smell-control trap “F” shown in figure 14 are on request.

CAUTION!!! If the safety relief valve is not connected to the discharge, opening of the valve could cause harm to individuals, animals or property.



A = BWR return pipe
B = BWR supply pipe
C = BWR return fitting
D = BWR supply fitting
E = gaskets
F = service pipe
G = service pipe

Figure 15 - Hydraulic connections for boiler with BWR type storage tank

5.12 - Hydraulic connections for boiler with BWR storage tank

The NOVADENS -- B or NOVADENS -- B0834 model boiler must be connected to a storage tank for the production of domestic hot water.
For this purpose, connection fittings to the storage tank have been provided for. For the preparation, operate as follows (refer to figure 15):

- mount pipe “F” to fitting “A”;
- mount pipe “G” to fitting “B”;
- mount fittings “C” and “D” respectively to “F” and “G”;

Take care to insert the appropriate gasket in each coupling.

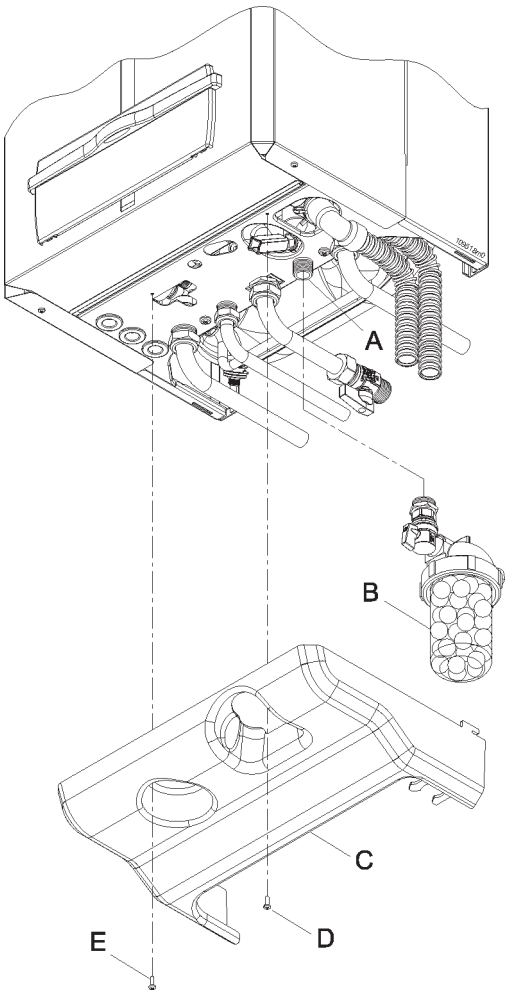


Figure 16 - Softener with filter

5.13 - Softener (on request)

If the boiler is to be installed in a geographic area where the domestic water hardness exceeds 25°F (250 mg/l), a softener must be installed on the cold water supply (see figure 16, detail “B”), so as to safeguard the appliance from any blockage in the domestic water circuit.
In order to facilitate installation, a softener may be request to COSMOGAS, with a specific installation kit.

Reference of Figure 17

A = Box tool’s control
B = stirrup of block
C = toward of opening
C = Cover
D = fixing screws
E = Cover electrical connexion board
F = toward of opening “E” cover
G = Power supply cable (not included)
H = Room thermostat cable (not included)

5.14 - Electrical connections: overview

CAUTION!!! The appliance is only electrically safe when it is correctly connected to an efficiently earthed system, carried out in compliance with current safety standards.

This is an essential safety requirement which must be checked. If in doubt, have the electrical system thoroughly checked by a qualified technician.

☞Have a qualified technician check that the electrical system is adequate for the electric power, indicated on the rating plate, required by the boiler.

☞The boiler must be connected to the mains electricity by connection using movable plug. Do not use adapters, multiple plugs or extensions, etc.

☞The boiler must be connected to the mains electricity by a three-pole electrical cable with double insulation and a minimum cross section of 1.5 mm2, resistant to a minimum temperature of 70°C (feature T).

☞To connect the boiler to the mains electricity, use a bipolar switch with a contact opening distance of at least 3mm, near to the appliance, in compliance with current standards on the subject.

☞Respect the polarity between live and neutral when connecting the boiler.

☞Ensure that heating and water piping is not used as earth plates for the electric and telephone systems. This piping is completely unsuitable for this purpose and, in addition, could rapidly lead to serious corrosion damage to the boiler, piping and radiators.

CAUTION!!! The boiler is not provided with any protection against lightening strikes.

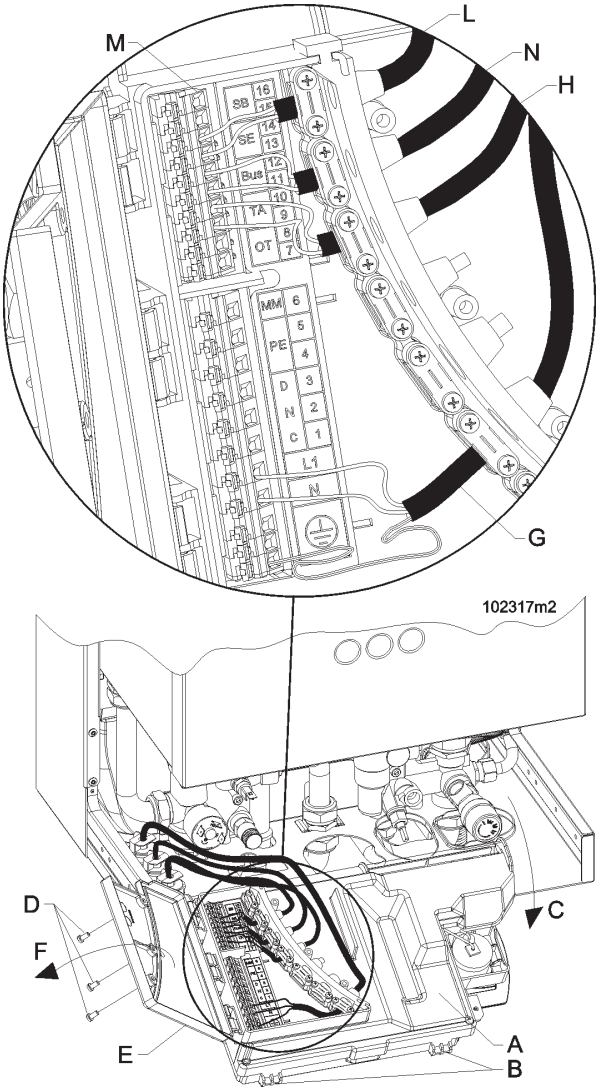


Figure 17 - Electrical connections

5.14.1 - Connecting the power supply cable

To connect the electrical power supply cable, proceed as follows (refer to figure 17):

- use a three-pole cable with double insulation and a minimum cross section of 1.5 mm2;
- remove the boiler casing following the instructions given in section 8.2;
- to rotate the panel "A" toward the front of the boiler acting on the stirrups "B";
- remove the screw “D” and open the cover “E”;
- lay the power supply cable “A” as shown in figure 17;
- strip the cable being careful to leave the earth wire (yellow green) 20 mm longer than the other two;
- connect the yellow green cable to the earth terminal (terminals “G”);
- connect the brown cable to terminal L1 (terminals “G”);
- connect the blue cable to terminal N (terminals “G”).

CAUTION!!! If the “L1” phase conductor is inverted with the neutral “N” conductor, the boiler will lock-out, displaying error code E21.

CAUTION!!! If the earthing system is not efficient, the boiler will lock-out, displaying error codes L05, E42 or E23 (depending on the entity of the inefficiency).

5.14.2 - Choosing the room thermostat/time-programmable thermostat

The boiler is designed to function with any type of room or time-programmable thermostat which has contacts for the boiler cable connections, and the following features:
- open/closed (ON/OFF);
- clean (not powered);
- closed when heating is required;
- electrical specifications 24Vac, 1A.

5.14.3 - Connecting the room thermostat/time-programmable thermostat

Install the room thermostat in a part of the house where the temperature is as near to average as possible and in any event **not** an area subject to sudden temperature changes, away from outside windows or doors (see figure 18).
To connect the room thermostat cable, proceed as follows (refer to figure 17):

- use a bipolar cable with a minimum cross section of 1.5 mm2 which leads from the boiler to the room thermostat/time-programmable thermostat;
- remove the boiler casing according to the instructions given in section 8.2;
- lay the electrical cable “H” exactly as shown in figure 17;
- get the cable to pass via a free cable clamp, not used by other wires;
- connect the 2 ends of the cable to the “TA” terminals (see figure 17, detail “M”).

CAUTION!!!
Since the cables of the room thermostat/time-programmable thermostat are subject to low safety voltage (24Vcc), they must run through ducts different from the 230Vac power supply cables.

5.14.4 - Installing the outside temperature sensor (on request)

Install the outside temperature sensor outside the house, on a wall facing NORTH or NORTH-EST, at a height of between 2 and 2.5 metres from the ground; on buildings with several floors, install near the upper half of the second floor. Do not install the sensor above doors, windows or ventilation outlets nor directly under balconies or gutter pipes Do not plaster the external temperature sensor. Do not install the sensor on walls without overhangs, or not protected from rain.
If the sensor is installed on a wall still to be plastered, it is necessary to install it with an adequate shim or remove it before plastering.

To connect the cable of the outside temperature sensor, proceed as follows:

- lay a bipolar electrical cable with a minimum section of 1.5mm2 which leads from the boiler to the external temperature sensor. The maximum length permitted is 20 m. For longer lengths, up to 100 m, it is necessary to use a shielded cable with an earthed shield;

CAUTION!!!
Since the cables are subject to low safety voltage (24Vcc), they must run through ducts different from the 230Vac power supply cables.

- connect the bipolar cable to terminals SE as shown in figure 17, detail “F”;
- connect the bipolar cable to the ends of the external temperature sensor.

Set the boiler so that it detects the outside temperature sensor, as follows:

- press down the button Reset for 12 seconds until the display blinking and shows U 1;
- then press and release the button Reset several times until the following parameter appears CH;
- using the + and − keys, change the CH parameter value from 00 to 01 or 02 in relation to the type of climatic heat adjustment desired (see section 7.4);
- press the Reset button repeatedly until exiting the menu; the display will no longer flash.

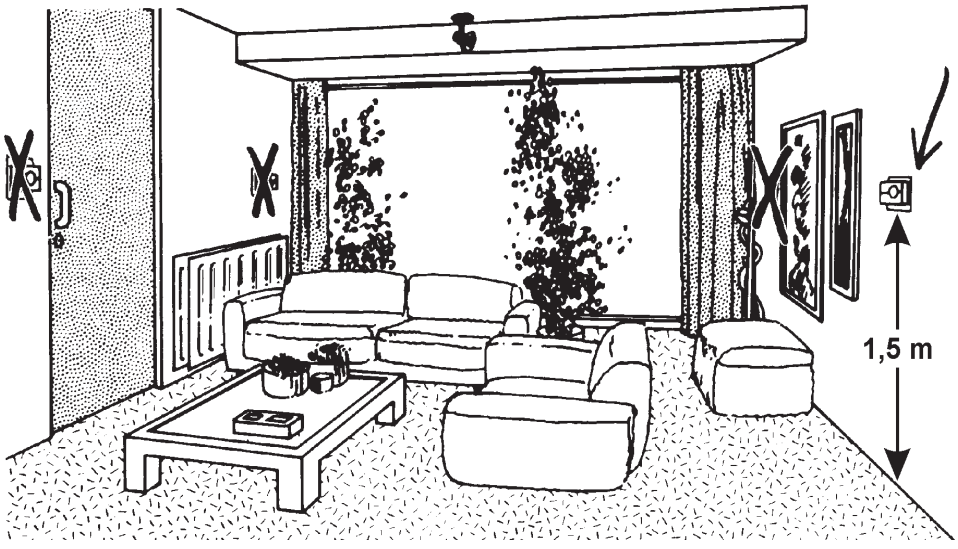


Figure 18 - Correct positioning of the room thermostat/time-programmable thermostat

5.14.5 - CR04 remote time control (optional)

The CR04 time control is a room thermostat capable of interacting with the boiler, adjusting the room temperature in a modulating manner and not by steps. This device is really a genuine heat regulator capable of operating, or otherwise, with the outside temperature sensor and therefore of adjusting the room temperature in an optimum manner. If the boiler has been factory purchased without this device, it is first of all necessary to fit an “Opentherm” interface board as described in the following section.
If the boiler has been purchased inclusive of the remote control, it means that the “Opentherm” board has already been installed on the boiler and it is only necessary to install the remote control as follows:
Install the CR04 remote control in a point of the building where the temperature is as close to that characteristic of the house and in any event in an area **not** subject to sudden temperature changes, far away from windows and doors which directly connect with outdoors (see figure 18).
In order to connect the room thermostat cable, proceed as follows (refer to figure 17):

- use a bipolar cable with a minimum cross section of 1.5 mm2 which leads from the boiler to the CR04 remote control. The cable must also be protected by means of the earthing of the protection and the maximum length permitted is 100 metres;
- dismantle the casing and access the electrical terminal board, following the specific instructions in section 8.2;
- connect the 2 ends of the cable to the “OT” terminals of the boiler (see figure 17).
- connect the other 2 ends of the cable to the terminals of the remote control (follow the instructions on the remote control).

CAUTION !!!
Since the cables of the remote control are subject to extremely low security voltage (24Vcc), they must pass through ducts different from the 230Vac supply cables.

Once the remote control has been connected, all the room temperature adjustments and domestic water temperature operations must be carried out directly on the same. Accordingly, remember to closely follow the instructions contained on the CR04 remote control.

5.14.6 - Installation of the CR04 remote time control on the boiler

If the boiler has been purchased with the CR04-type time control, in order to enable the same it is necessary to install the “Opentherm” interface board on the boiler following the instructions contained on the remote control.

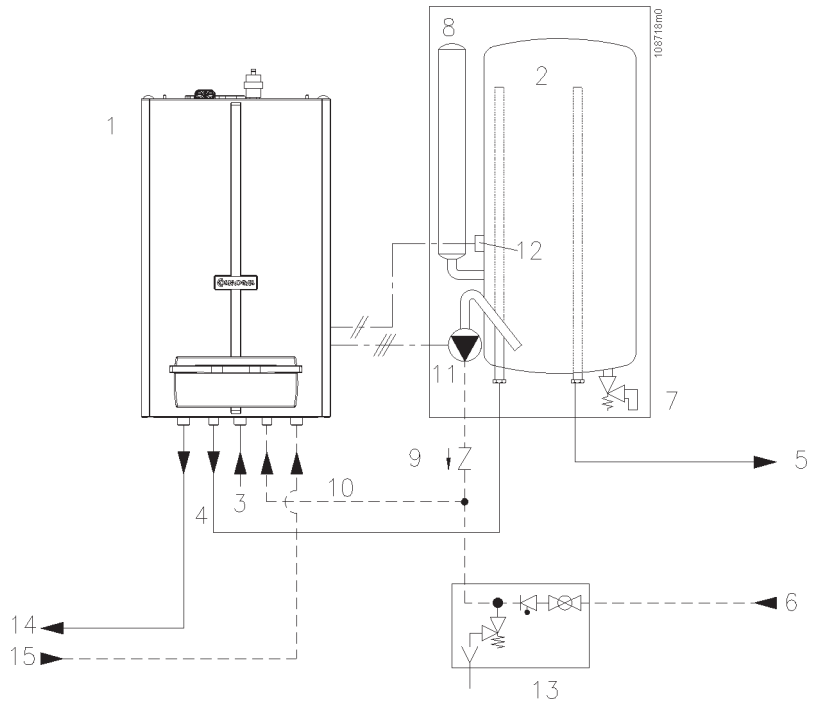
5.15 - Connecting the boiler to the B70C type water heater (optional)

The boiler can be immediately or subsequently connected to a B70C type storage tank manufactured by Cosmogas.
The water connection must be carried out as per figure 19.
For the electrical connection, proceed as follows (refer to figure 21):

- disconnect the electricity supply to the boiler;
- access the internal components and the electrical components of the boiler, following the specific section 8.2;
- move the switch 1 to position “B” (ON);
- Remove the cable from the sonde “17” of figure 1;
- lay the bipolar cable with a minimum 1.5mm2 section which goes from the boiler to the temperature sensor of the water heater and connect it on the boiler to terminals “15” and “16” (SB);
- connect the other end of the cable to the temperature sensor of the water heater;
- insert the probe of the temperature sensor into the socket “12” as shown in figure 19.

CAUTION!!! Since the cables are subject to low safety voltage (24Vcc), they must run through ducts different from the 230Vac pump power supply cable.

- connect a three-pole double insulated electrical cable (Live, Neutral and Earth), with a minimum cross section of 1.5mm2 which is resistant to a minimum temperature of 70°C (feature T) to terminals “3” and “5” and to the earth connection, and connect the other end of the cable directly to the pump of the storage tank (see figure 19, detail “11”);

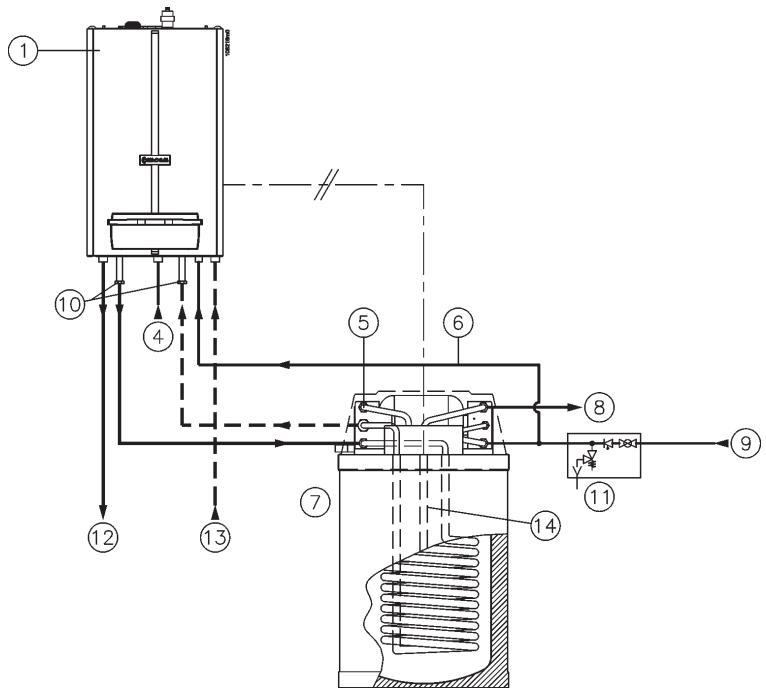


1 COSMOGAS boiler
2 B70C type storage tank (on request)
3 Gas supply
4 d.h.w. supply to water heater (to be fitted by the installer)
5 d.h.w. outlet
6 Cold water
7 Safety relief valve
9 Check valve (to be fitted by installer)
10 Recirculation for storage tank loading (to be fitted by installer)
11 Storage tank loading pump
12 Temperature sensor
13 Hydraulic safety unit (to be fitted by installer)
14 Heating supply
15 Heating return

Figure 19 - Hydraulic connection to B70C storage tank type

5.15.1 - Prevention against Legionnaires disease

If the boiler is connected to a storage tank for the preparation of domestic hot water, a disinfection cycle is envisaged against Legionnaires bacteria. This cycle anticipates taking the storage tank to a temperature of 60°C (temperature at which said bacteria die) at least once a week. Therefore, the water (at certain times) may reach the user at a higher temperature than that set on the knob on the specific control.
The first time the boiler is started up, the anti-Legionnaires cycle is also started after 2 hours of running.



1 COSMOGAS boiler
2 -
3 -
4 Gas supply
5 -
6 Connection for filling the heating system (to be carried out by the installer)
7 BWR C type storage tank
8 Domestic hot water outlet
9 Cold water inlet
10 Supply and return for storage tank loading
11 Hydraulic safety unit (to be fitted by installer)
12 Supply pipe to heating system
13 Return pipe from heating system
14 Temperature sensor socket

Figure 20 - hydraulic connection to BWR C type storage tank

5.16 - Connecting the boiler to the BWR C type storage tank

Only the NOVADENS -- B and NOVADENS -- B0834 model boilers can be connected to a BWR type storage tank.

The water connection must be carried out as per figure 20.

For the electrical connection, proceed as follows (refer to figure 21):

- disconnect the electricity supply to the boiler;
- access the internal components and the electrical components of the boiler, following the specific section 8.2;
- move switch 1 to position “B” (ON);
- Remove the cable from the sonde “17” of figure 1;
- lay the bipolar cable with a minimum 1.5mm2 section which goes from the boiler to the temperature sensor of the storage tank and connect it on the boiler to terminals “15” and “16” (SB);
- connect the other end of the cable to the temperature sensor of the storage tank;
- insert the probe of the temperature sensor into the socket of the storage tank (see figure 20, detail 14).

5.16.1 - Prevention against Legionnaires disease

See chapter 5.15.1.

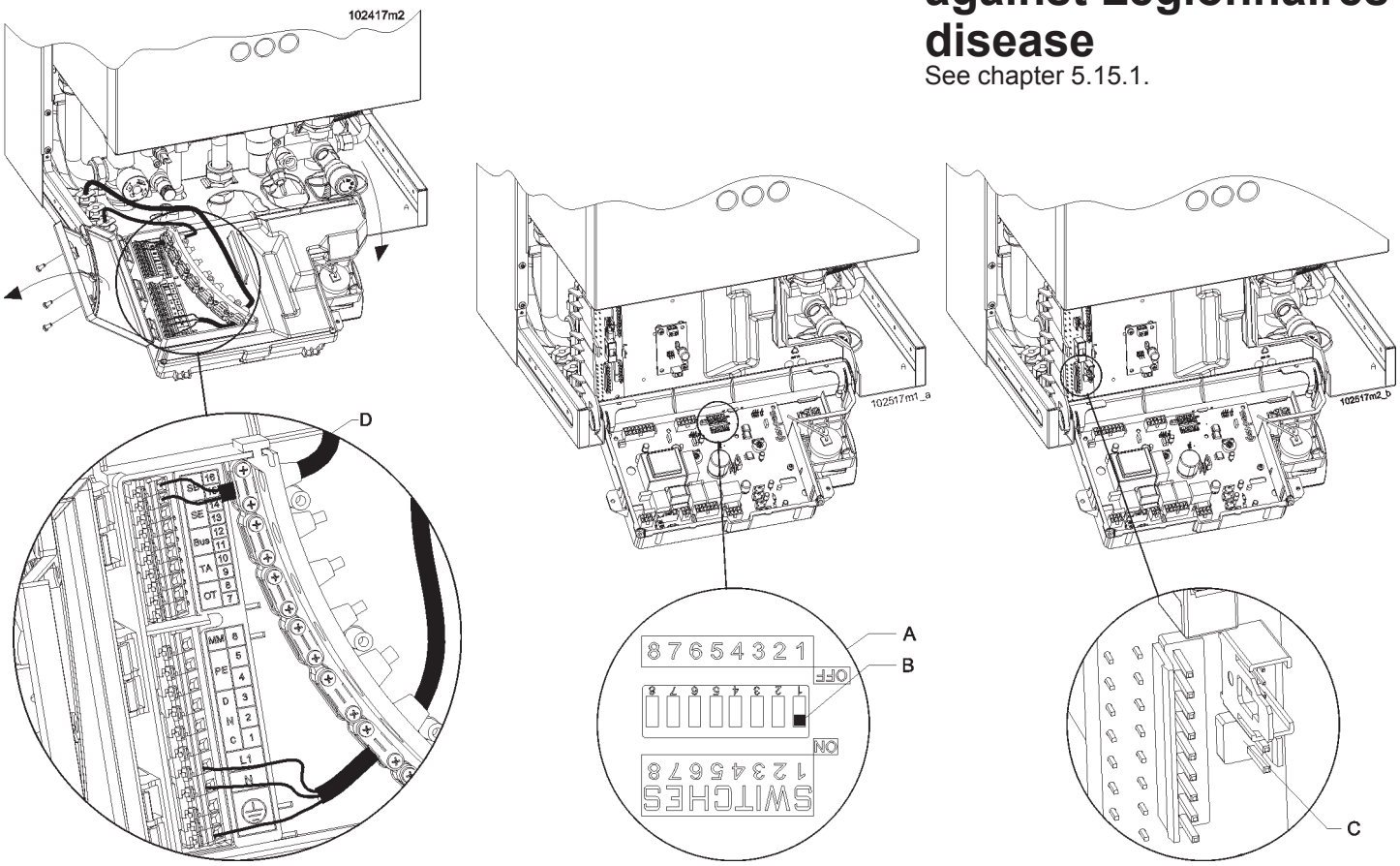


Figure 21 - Electrical connection to a B70C or BWR C type water heater

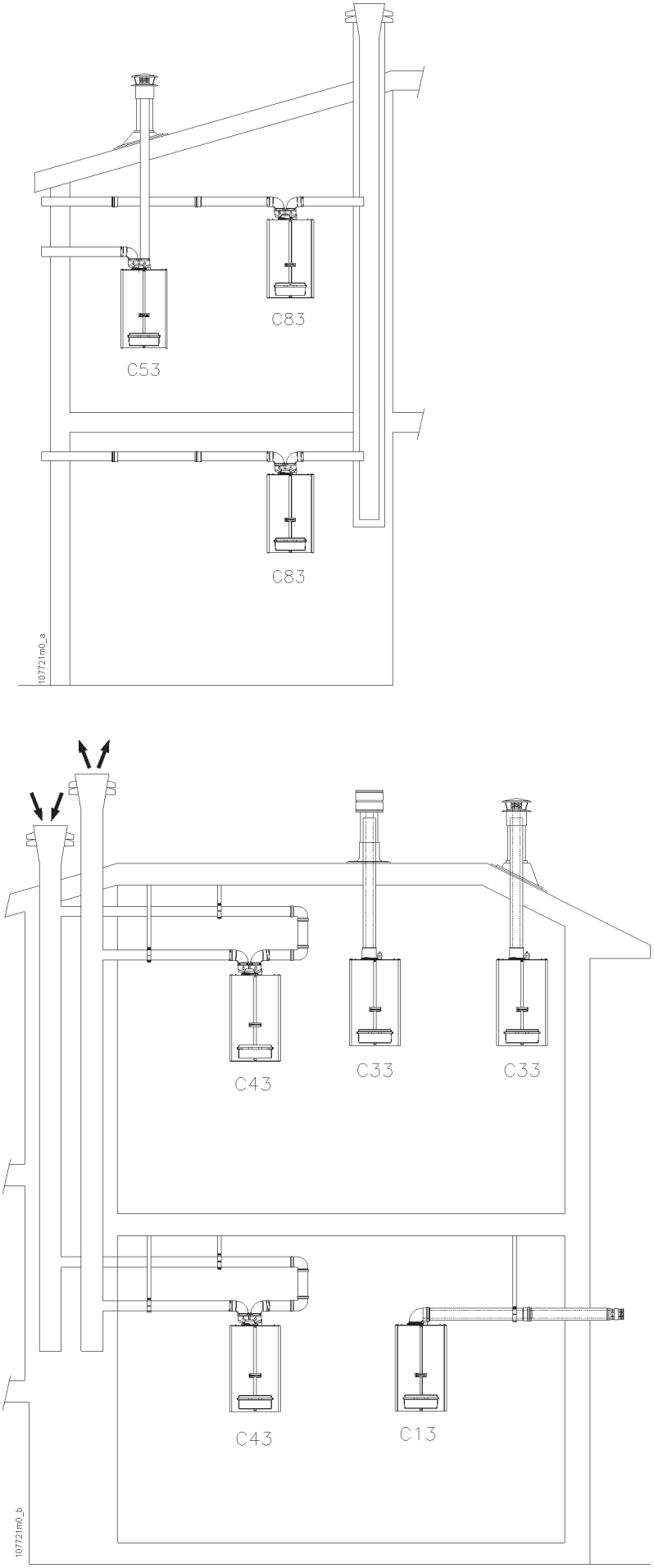


Figure 22 - Approved discharge/intake systems

5.17 - Venting systems

CAUTION!!! All venting systems must be connected in compliance with current national and local standards.

CAUTION!!! Under determinate conditions, the temperature of the appliance's flue gases may reach 110°C. Therefore, use plastic piping capable of resisting this temperature.

CAUTION!!! This is a "condensation-type" appliance. In order to create the flue gas discharge, use materials in AISI 316L stainless steel or plastic materials in polypropylene, so as to avoid corrosion due to the acidity of the condensation.

Remember that this type of appliance must have discharge and intake pipes supplied by the appliance manufacturer.

Any other types of pipe must be approved.

The approved types of flue gas discharge system are given in the table of technical features at the end of the manual, under the heading "type", and on the boiler rating plate, again under the heading "type". The symbols used to define the type of discharge system are as follows(see also fig.22):

- C13, coaxial through vertical wall;
- C33, coaxial through the roof;
- C43, separate with discharge in the chimney, intake through another same channel;
- C53, separate discharge through roof and intake through wall, or in two places with potentially different pressure;
- C63, the boiler can be fitted to approved intake and discharge pipes of another manufacturer;
- C83, separate with intake through the wall, or another point, independent of venting for other appliances, with discharge into the chimney flue.

During operation, especially in Winter, again due to high efficiency, the boiler may discharge white smoke. This is a purely natural phenomenon and not a reason for concern, as it is steam from the gas fumes condensing on contact with the outside air.

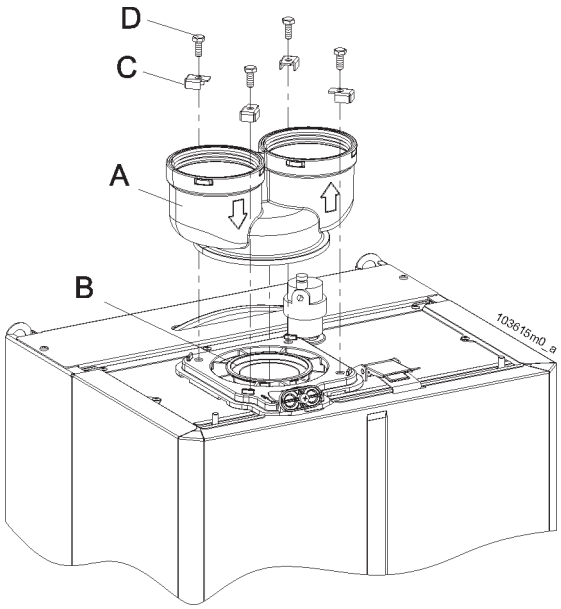


Figure 23 - Installation of “split 80/80 PP” system

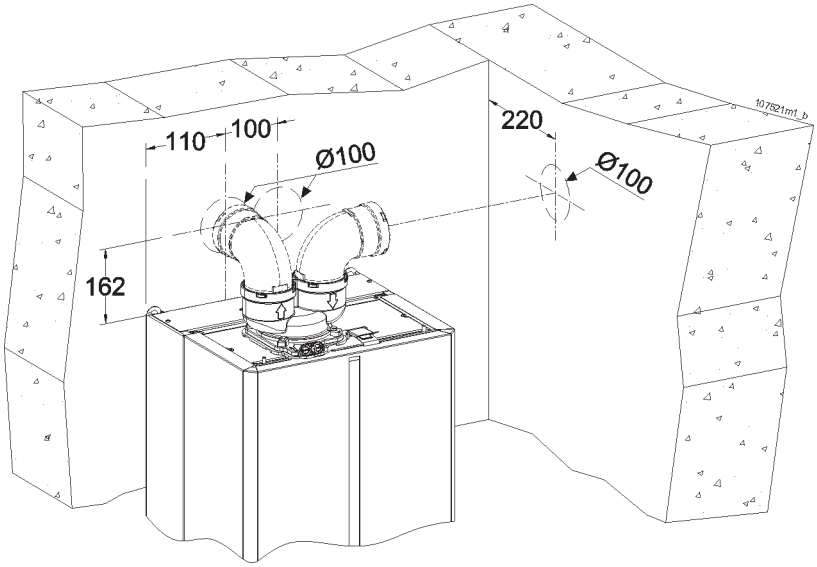


Figure 24 - Dimensions

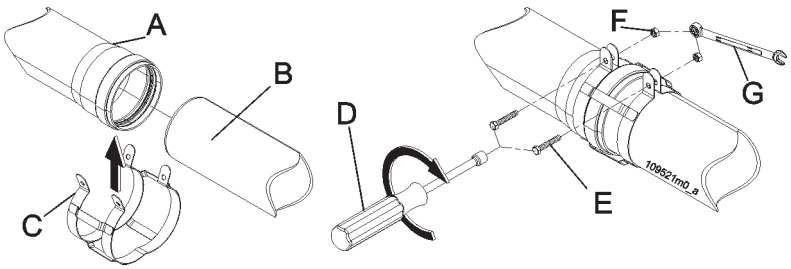


Figure 25 - Fixing the flue gas discharge and air intake pipes

5.17.1 - “Split 80/80PP” system (polypropylene)

The standard appliance is not supplied with fittings for connecting flue gas discharge outlets/ air intakes. A special kit is available on request for connecting the boiler to the “split 80/80PP system”, to be installed following figure 23. Fitting “A” can freely turn 360 degrees, thereby guaranteeing optimum installation versatility.

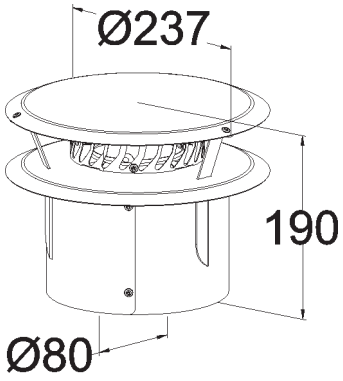
- ☞ It is advisable to install AISI 316L type stainless steel pipes or polypropylene pipes on the flue gas discharge side, which are more resistant to the formation of condensation.
- ☞ Take particular care when installing piping through a wall to the outside; install the pipes in sheathing so that they can be easily slipped out for access during routine maintenance.
- ☞ Horizontal sections must always be pitched by at least 2% towards the condensation drainage system.
- ☞ The boiler comes supplied with a condensation collector which must be fitted to a discharge pipe (see section 5.10).

CAUTION!!! This condensation drainage system is designed to empty all the liquid produced by one single appliance. If installing more than one boiler, each must be equipped with its own drainage system.
The flue gas discharge/air intake systems can be extended up to the maximum distance given in section 9 at the end of the manual. Each 90° elbow has an equivalent loss of 1 metre of straight pipe. Each 45° elbow has an equivalent loss of 0.5 m of straight pipe.

CAUTION!!! Mechanically secure the joints between the different components of the flue gas discharge and intake pipes with fixing screws or equivalent systems. See figure 25.

CAUTION!!! During operation, the temperature of the discharge pipe can exceed 110°C. Insert protective heat insulating sheathing if it has to pass through walls which are vulnerable to such temperatures.

CAUTION!!! Leave a minimum gap of 1 metre between the air intake and flue gas discharge terminals if they are located on the same wall.



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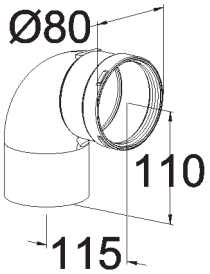
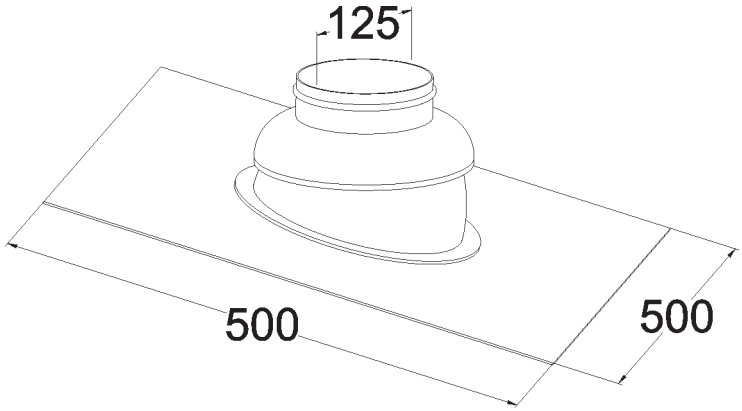


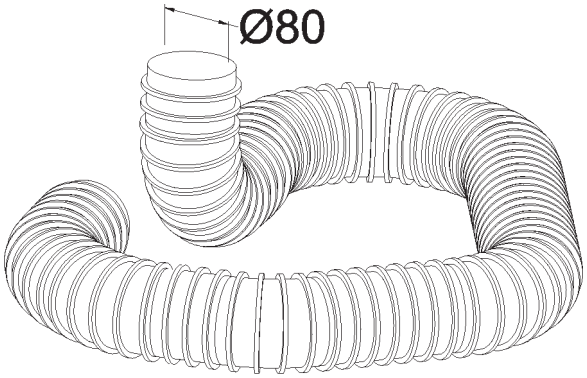
COD. 62617244

5.17.2 - "Split 80/80PP" system: available accessories

Some of the most commonly used accessories for installing the split system of flue gas discharge/air intake 80/80PP are listed below; a much wider range however can be found in the special catalogue:
(the number after the code refers to the part in the following drawings)
62617053 - No. 9 chimney cap draft damper for the roof
62617244 - No. 12 90° elbow M/F in PP
62617255 - No. 29 flashing for roofs pitched between 15° and 25°
62617236 - No. 11 extension M/F in PP
62617248 - No. 18 anti-extraction clamp for PP extensions
62617240 - No. 14 flexible M/F pipe in PP L=20m
62617241 - No. 16 spacer for flexible pipe
62617238 - No. 17 telescopic joint in PP
62617242 - No. 15 T fitting in PP



COD. 62617255



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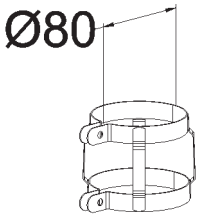

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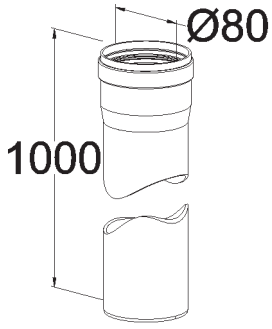

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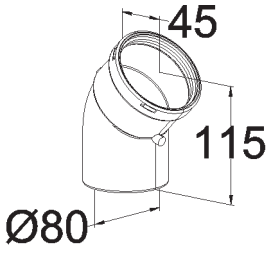

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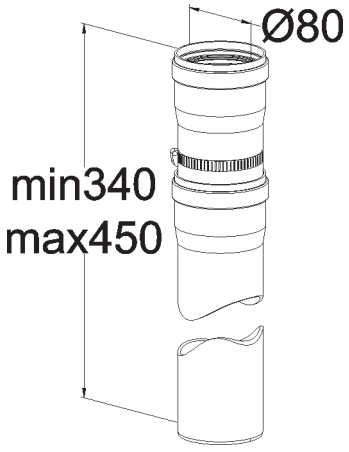

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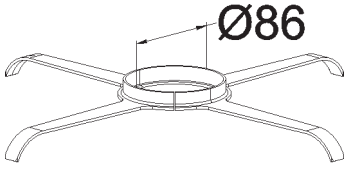

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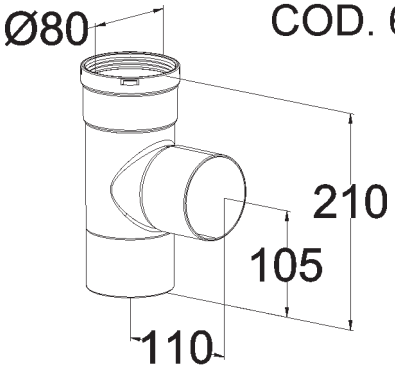

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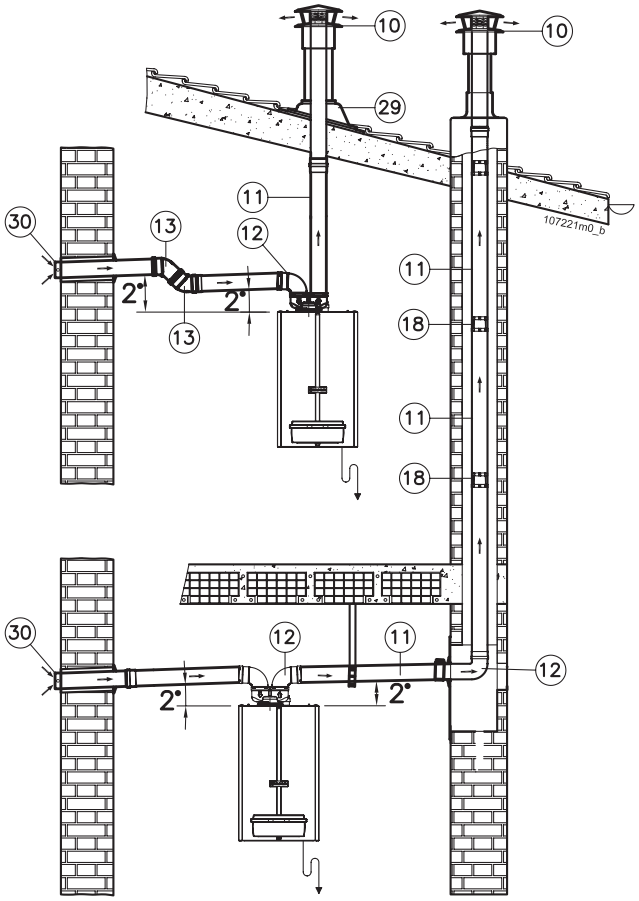


Figure 26 - Installation example "Split 80/80 PP" system

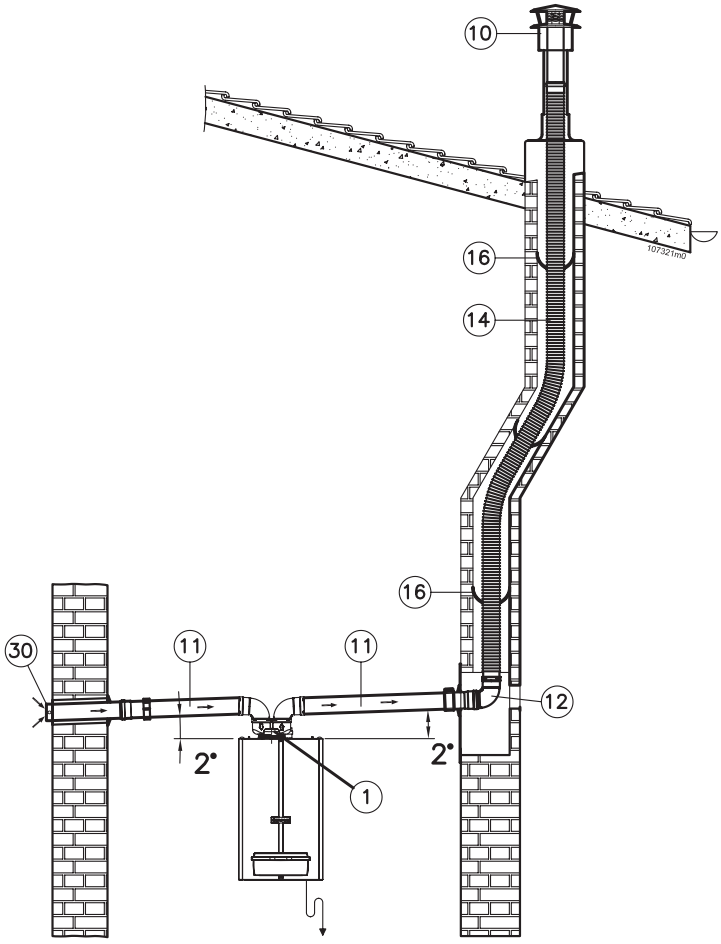


Figure 27 - Installation example "Split 80/80 PP" system

5.17.3 - "Split 80/80PP" system: installation examples

Two installation examples can be seen in figure 26:

- discharge into chimney with collection of condensation at base of the chimney.

The horizontal part of the flue gas discharge side must be pitched towards the "T" with condensation collection.

The intake must be pitched outward to prevent rainwater entering.

- discharge directly outside with the pipes of the boiler with collection of condensation inside the boiler itself.

The intake must be pitched outward to prevent rainwater entering.

A separate type flue gas discharge example can be seen in figure 27 where the discharge of the flue gases is carried out with plastic flexible pipes, for piping of technical pits.

All the condensation produced in the vertical pipe is conveyed inside the boiler

The intake must be pitched outward to prevent rainwater entering.

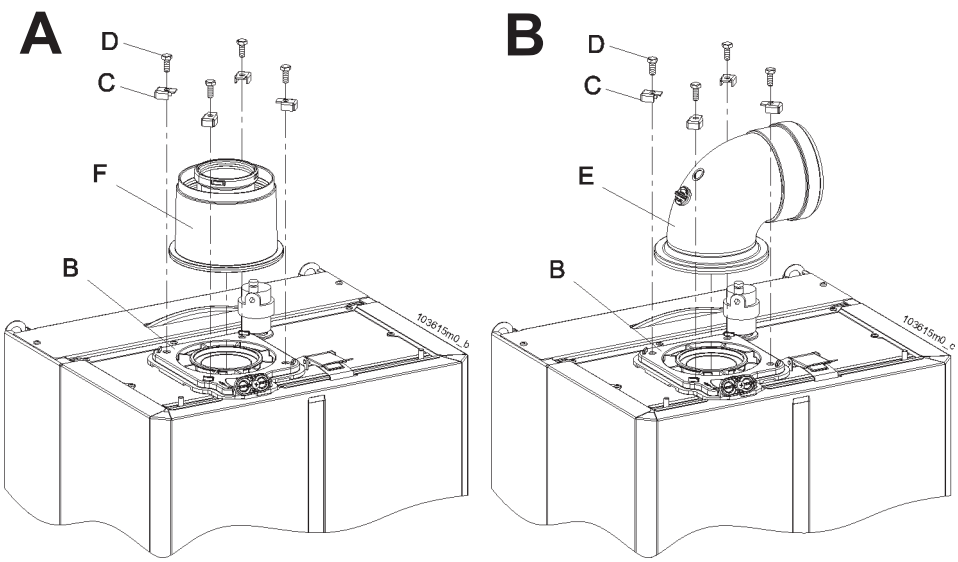


Figure 28 - Installation of the vertical coaxial system (A) or the horizontal coaxial system (B)

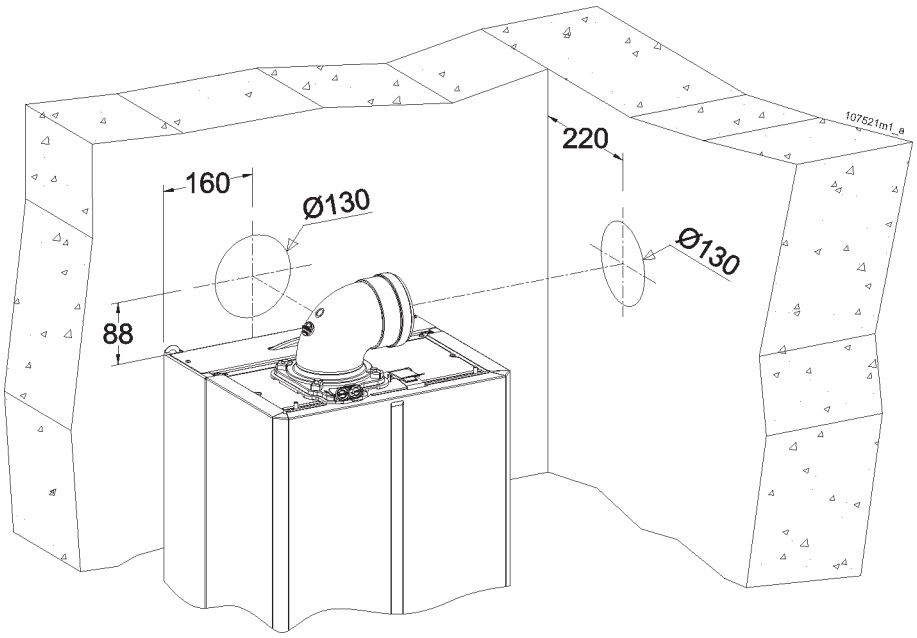


Figure 29 - Pre-installation figures and distances between holes for coaxial discharge system

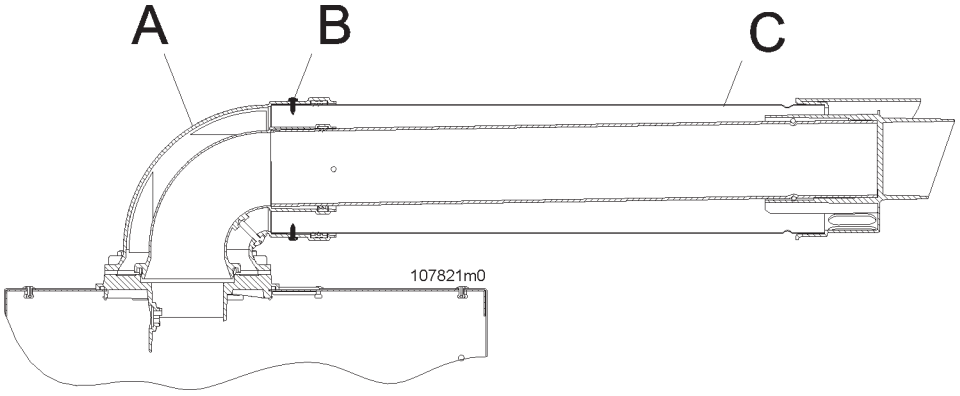


Figure 30 - Positioning of the coaxial pipe

5.17.4 - "Coaxial 60/100PP" system (polypropylene)

The standard appliance is not supplied with fittings for connecting flue gas discharge outlets/air intakes. A special kit is available on request for connecting the boiler to a "coaxial 60/100PP" system, to be installed as shown in figure 28, where the vertical discharge is shown on the left under letter "A" and the horizontal discharge on the right under letter "B":

CAUTION!!! Scrupulously follow the installation steps for the coaxial pipe as illustrated in figure 26. In particular, it is necessary to

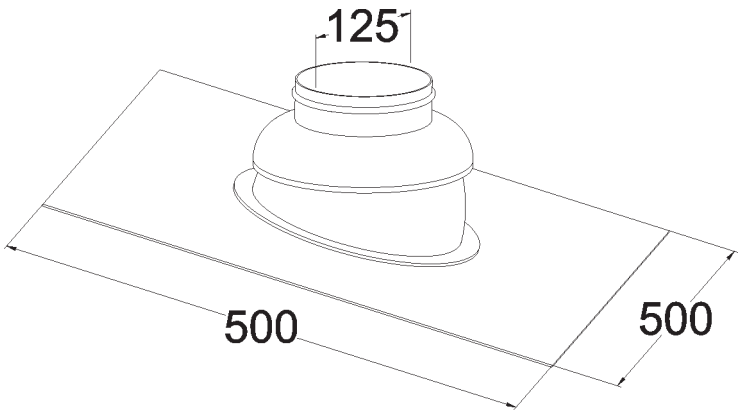
- insert the coaxial pipe "C" inside elbow "A";
- secure the outer pipe with stainless steel self-tapping screws "B".

CAUTION!!! After the above operations, check that the end of the discharge/intake faces outwards with the tolerances shown in figure 31.

☞ Take particular care when installing piping through a wall to the outside; install the piping in sheathing so that it can be easily slipped out for access during routine maintenance.

☞ Horizontal sections must always be pitched by at least 2% towards the boiler.

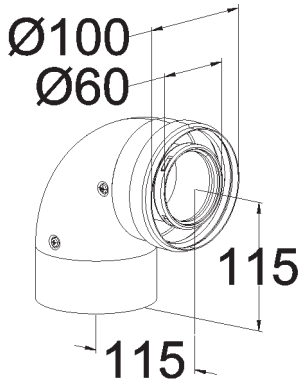
☞ The flue gas discharge/air intake pipe can be extended up to the maximum distance given in the table in section 9 at the end of the manual.



COD. 62617255

5.17.5 - “Coaxial 60/100 PP” system: available accessories

The following accessories are available, on request, for installing the flue gas discharge/air intake system 60/100:
(the number after the code refers to the part in the following drawings)
62617255 - No. 2 flashing for roofs pitched between 15° and 25°
62617234 - No. 1 Coaxial elbow 90° M/F PP
62617252 - No. 6 Coaxial elbow 45° M/F PP
62617231 - No. 7 Coaxial extension L 1m PP
62617250 - No. 3 Coaxial roof end piece PP
62617232 - No. 5 Coaxial wall end piece PP



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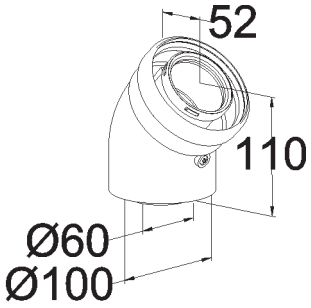
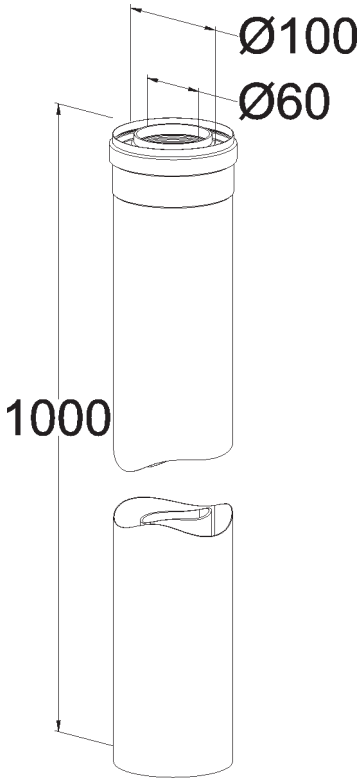
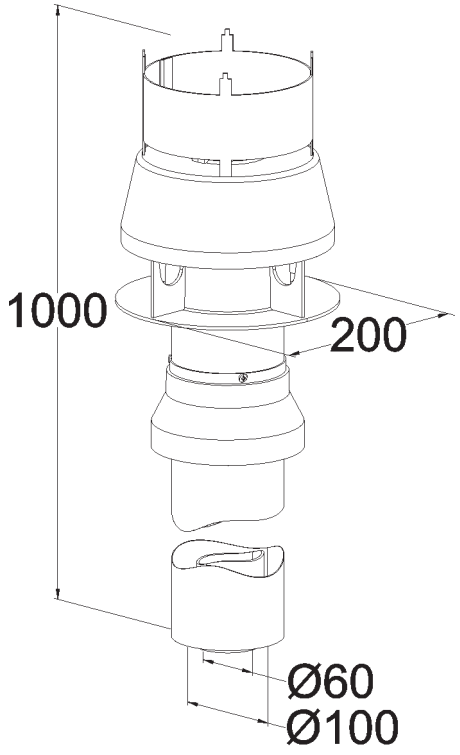


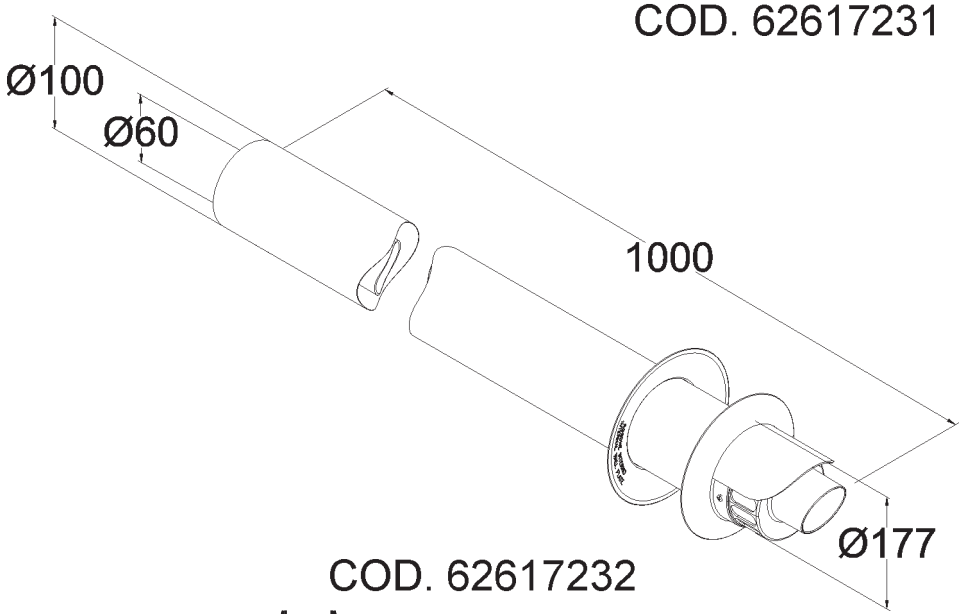
COD. 62617252



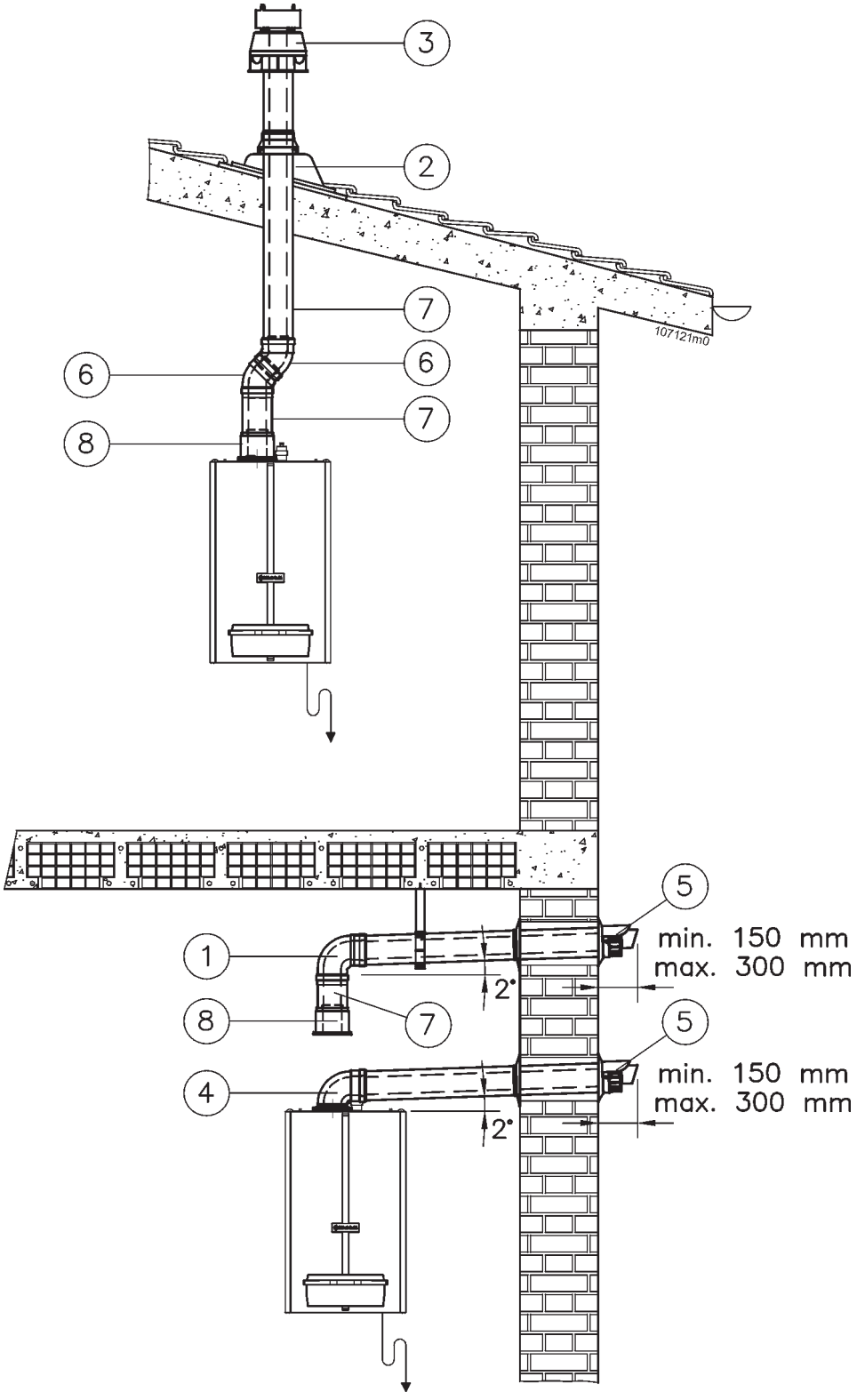
COD. 62617231



COD. 62617250



COD. 62617232



5.17.6 - “Coaxial 60/100PP” system: installation examples

When a coaxial discharge is installed (see figure 31), whether it is vertical or horizontal, it is indispensable to slope the discharge pipe upwards so as to get the condensation to flow inside the boiler.

Figure 31 - Installation examples for the coaxial pipe

6.1 - Operating

Before starting the appliance up, it is necessary to carry out the following.

6.1.1 - User instructions

The user must be correctly instructed on how to operate the appliance, in particular:

- ☞Make sure that the user has the instruction and users' manual and all other documentation included in the packaging.
- ☞Make sure the user is informed of all the special measures to be taken for discharging flue gases, and that these must not be modified.
- ☞Inform the user with regards to adjusting the water pressure in the system and all necessary measures for filling and bleeding air.
- ☞Correctly inform the user on how to adjust temperatures, controls/room thermostats and radiators to save energy.

6.1.2 - Filling of the condensation discharge trap

The trap is positioned inside the boiler (see figure 1, detail 40), and must be filled with water in order to create the head capable of avoiding the leakage of the flue gases from the pipe "36" of figure 1. Proceed as follows for this purpose:

- disconnect the flue gas discharge fitting from opening "2" as per figure 1;
- from the central opening (flue gas discharge), slowly pour in approximately 100 cm3 (a glass full) of water;
- re-connect the flue gas discharge fitting;

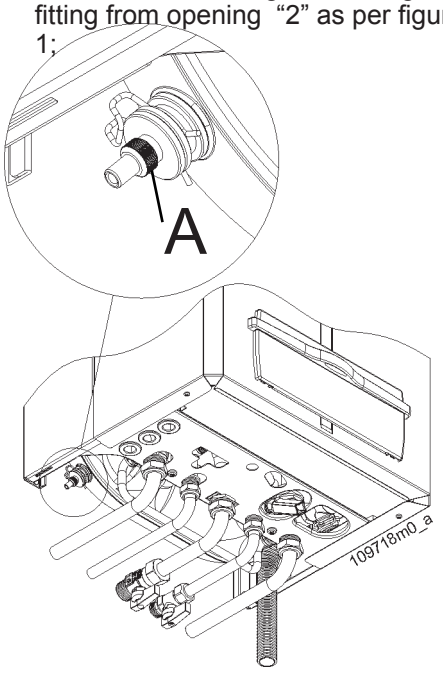


Figure 32 - Bleed screws of the secondary heat exchanger

6.1.3 - Filling the heating system

If at the time of switching on the power to the boiler, FILL appears on the display, it means that it is necessary to fill the heating system. Proceed as follows:

☞The heating system must only be filled with clean water from the mains supply.

CAUTION!!! The addition of any chemical substance, such as anti-freeze, must be carried out according to the product instructions. These substances must never be inserted directly into the boiler.

- Open the automatic air vent a couple of turns (see figure 1, detail "1") situated at the top of the boiler.
- Open the supply cock located under the boiler (see figure 1, detail "34") and proceed to fill the system and appliance to about 1.5 bar (FILL disappears from the display).
- Check that there is no water leaking from the fittings.
- Close the supply cock (see figure 1, detail "34");
- Purging the air from the radiators.
- Check the pressure gauge reading of the boiler once again. If it has dropped, re-fill again until its reads 1.5 bar

6.1.4 - Filling of the secondary heat exchanger of the domestic hot water

Once the heating circuit has been filled, it is also necessary to carry out the filling of the secondary heat exchanger. Proceed as follows:

- connect a rubber tube to the pressure coupling "A" shown in figure 32 and take it to the discharge of a sink or similar;
- loosen screw "A" as shown in figure 32 until you hear the air escape and wait until just water runs out;
- tighten screw "A" once again as shown in figure 32;
- remove the tube previously connected and check that there are no water leakages.

6.2 - General warnings concerning gas supply

When starting up the boiler for the first time, have qualified technicians check the following:

- ☞That the boiler is powered by the type of fuel it is designed to use.
- ☞That the gas supply pressure (with boiler on and boiler off) is within the maximum and minimum values given in the table in section 9 at the end of the manual.
- ☞That the gas supply system is provided with all the safety devices and controls required under current national and local legislation.
- ☞That the flue gas discharge terminal and the air intake terminal are free from any blockages.
- ☞That the condensation discharge connection is connected.

CAUTION !!! If you smell gas:

A - Do not use any electrical appliance, including telephones or any object which might cause sparks;

B - Immediately open doors and windows to produce a current of air to rapidly clear all gas from the room;

C - Immediately call, from another room or from a neighbour's house, a qualified technician or the gas board. If you cannot contact them, call the Fire Brigade.

6.3 - Gas type indicated for the boiler

On the front of the boiler there is a label indicating the type and supply pressure of gas to be used for the boiler.
The boiler can have one of the following two labels:

2H-G20-20mbar NATURAL GAS

means that the appliance should be used with gas type H of the second family (natural gas), at a supply pressure of 20 mbar.

3P-G31-30mbar L.P. Gas

means that the appliance should be used with gas type P (Propane also known as L.P.Gas) of the third family, at a fixed supply pressure of 30 mbar

6.4 - Converting the boiler from one gas type to another

Conversion of the appliance to use another type of gas must be carried out by a qualified technician.
If the gas available is not of the type to be used with the appliance, it must be converted. Special conversion kits are available for this purpose.

6.5 - Start-up

- Open the gas cock.
- Switch on electric power to the boiler.
- If the display shows code E 21, it means that the polarity has not been observed between phase and neutral. Therefore it is necessary to rotate them.
- Upon start-up, an F is shown for 2 minutes during which the purging of the plant takes place. If you wish to by-pass this stage, just press the keys + and - together until a blinking F appears. Then press the RESET button.
- Rotate the controls “30” and “31” shown in figure 1 to the desired temperature.
- The heating service will only start up when the room thermostat calls for heating. If an external temperature sensor is connected, check that the temperature calculated is higher than the minimum running temperature (see section 7.4).
- If the pump indicator is illuminated but the pump (see figure 1 detail “39”) is not running, try releasing it using the special screw (remove the screw “47” shown in figure 1 and turn the screw underneath).
- If the pump indicator is illuminated but the radiators do not heat up, repeat air bleeding operations on both the boiler and the radiators.

6.5.1 - Auto-purging

Each time the power supply to the appliance is switched on, a procedure for the auto-purging of the air in the plant commences, lasting 2 minutes. The procedure involves the switching on and off of the pump in order to facilitate the evacuation of the air. Before starting the procedure up, ensure that you have opened the automatic air vent (detail “1” of figure 1).

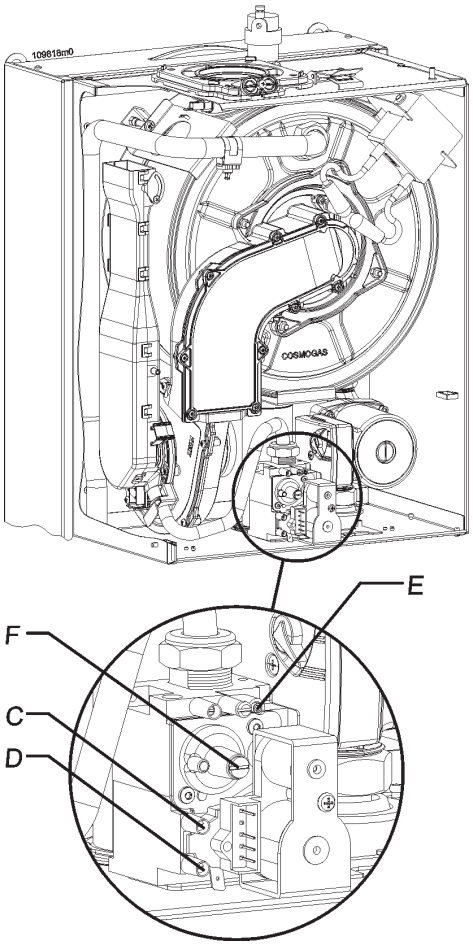
6.6 - Checking and adjusting the gas supply pressure

The gas supply pressure must match that given in the table in section 9 at the end of this manual. Check as follows:

- close the gas cock;
- access the internal components of the boiler following the procedure in section 8.2;
- loosen the pressure connection “D” (see figure 33);
- connect a pressure gauge with a definition of at least 0.1 mbar (1 mmH2O);
- open the gas cock;
- check that the pressure does not exceed the value given in the table in section 9 at the end of the manual under the heading “Maximum gas supply pressure;
- switch on the boiler and generate a heating request (turn control “31” shown in figure 1 to maximum) and ensure that the room thermostat calls for heating;
- press together the + and − keys for more than 10 seconds, the display will show F ;
- press the key + until the display shows t . Now the boiler will run for 10 minutes at maximum power;
- check that the pressure does not drop below the values given under “Minimum gas supply pressures” in the table in section 9 at the end of the manual.

If the supply pressure does not fall within the above values, operate upstream of the appliance to bring the pressure within the maximum and minimum range given in the table.

At the end of the check, close the pressure connection “D” and checking for any gas leaks.



C - Service pressure probe
D - Gas inlet pressure probe
E - CO2 adjusting screws

Figure 33 - Gas valve

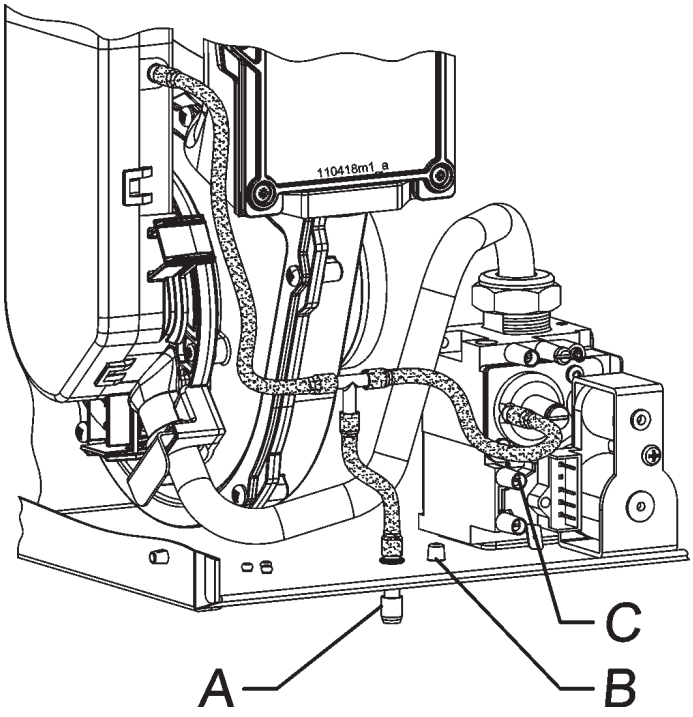


Figure 34 - Comburant air pressure probes

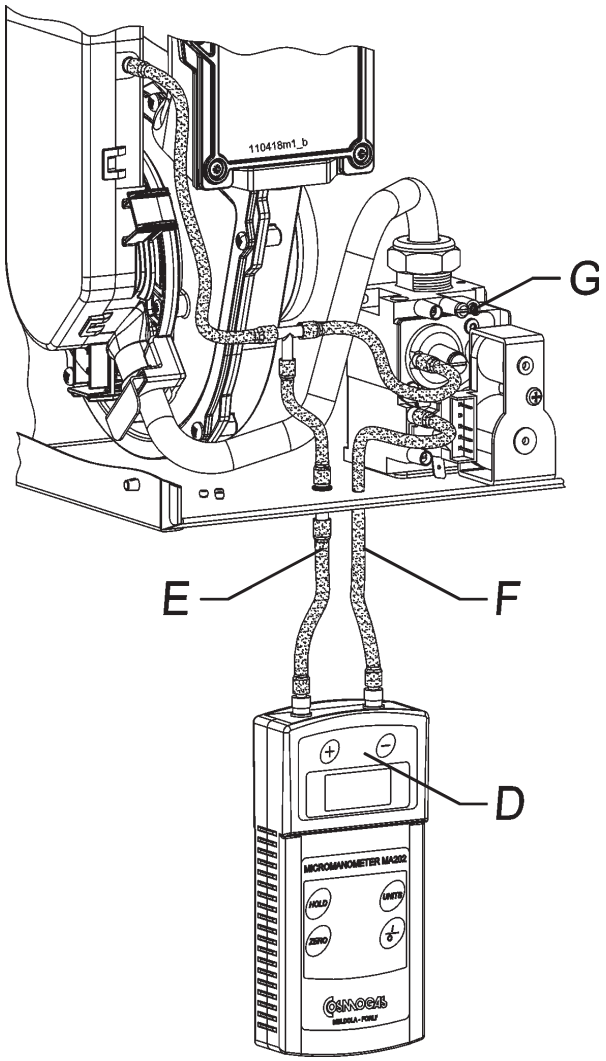


Figure 35 - Checking the comburant air pressure

6.7 - Checking the comburant air pressure

Since the boiler has a factory-set air/gas ratio, the pressure of the gas at the burner is controlled indirectly; the comburant air pressure is checked inside the boiler and must correspond with that shown in the table in section 9 under the item "Comburant air pressure"

To carry out the check, proceed as follows (refer to figures 34 and 35):

- use a differential pressure gauge with a precision of at least 0.1 mbar (1 mmH2O);
- close the gas cock;
- open the boiler casing following section 8.2;
- remove plug "B";
- loosen the screw of the pressure probe "C";
- insert a tube "F" which goes from the pressure gauge, passing through the opening of the plug "B", to the pressure probe "C" (as in figure 35);
- remove the plug "A" from the pressure probe and connect the differential pressure gauge;
- the connection must be carried out as in figure 35, scrupulously observing the polarity of the pressure, shown on the pressure gauge;
- **close up the casing "L" as per figure 40. It is indispensable to have a reliable measurement;**
- switch on the boiler;
- press keys + and − together for more than 10 seconds, until F is displayed;
- now the fan is forced to maximum power, with the burner off, for 10 minutes;
- compare the pressure value on the pressure gauge with the table in section 9, "Comburant air pressure";
- if the pressure is at a lower value, check that there are no obstructions in the comburant air/flue gas discharge circuit;
- press the Reset key to return the boiler to normal running conditions;
- once the check has been carried out, reassemble everything as it was originally.

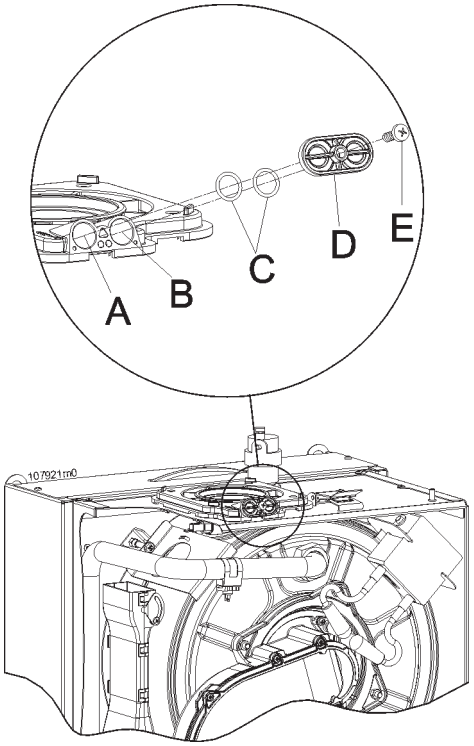


Figure 36 - Combustion analysis probes

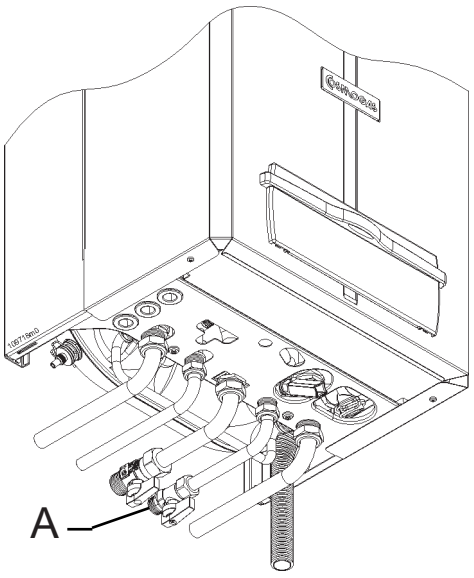


Figure 37 - Domestic hot water flow selector switch

6.8 - Checking and adjusting CO2 levels

The levels of CO2 (carbon dioxide) in the boiler, under normal operating conditions, and below an altitude of 1,000m, are given in the table in section 9. Different values to those given may lead to malfunctioning. In order to check this value, carry out an analysis of the combustion. Proceed as follows:

- connect a combustion analyser to the special connection on the discharge fitting “B” of figure 36;
- generate a heating request or, if this is not possible, fully open a domestic hot water tap ;
- press together the + and − keys for more than 10 seconds, the display will show F- ;
- press the + − key until the display shows t- (if there is a heating request) or until S- is displayed if a domestic hot water request has been generated.

Now the boiler will run for 10 minutes at maximum power.

- wait until the level of CO2 stabilizes;
- compare the reading with that given in the table in section 9, headed “CO2 levels”.

If the reading differs from that in the table, it must be brought within the range of the values given in the table in section 9. Proceed as follows:

- use a screwdriver on screw “E” (see figure 33;
- turn clockwise in order to reduce the level of CO2. Turn counter-clockwise in order to increase the level of CO2;
- press the − key until the display shows t-, or S- if tested in domestic mode. Now the boiler will work for 10 minutes at minimum power;
- Check the CO2 value; it must drop by 0.5% with respect to the value obtained at maximum power. Otherwise, use screw “F” in figure 33 to correct the CO2 value (turn in a clock-wise direction to increase, turn in a counter-clockwise direction to decrease)
- Once again check the CO2 at maximum power and if necessary carry out a further adjustment.
- Once finished, seal the screws “E” and “F” as in figure 33 with red paint or a similar system;
- press the Reset button to return the boiler to normal operating conditions.

CAUTION!!! During this phase, if the power supplied to the boiler is much higher than the power absorbed by the system, the boiler will switch off in continuation in order to reach the maximum temperature permitted (45°C for low temperature systems, 85°C for radiator systems), or the flue gas safety thermostat intervenes, and the boiler will show block L06. This could also occur in the event that domestic water analysis is carried out, if the domestic water pressure is low or the temperature of the domestic cold water is very high.

In order to avoid this inconvenience, it is necessary to set the heating output, to the effective needs of the system, as indicated in the following section and analyze the CO2 or the combustion efficiency, setting the forcing mentioned previously at t- (letter “t” with dash in middle) or S- (letter “S” with dash in middle) for domestic water.

Necessary power (kW)	BOILER MODEL 15	24	34	45
44				97
42				92
40				86
38				81
36				76
34			96	70
32			89	65
30			81	59
28			74	54
26			67	49
24		95	59	43
22		85	52	38
20		75	44	32
18		65	37	27
16		55	30	22
14	92	45	22	16
12	76	35	15	11
10	60	25	7	5
8	44	15		
6	28	5		

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Tabella per la regolazione della potenza in riscaldamento

6.9 - Adjusting the heating capacity

The boiler has been constructed with an “intelligent” conception of the adjustment of the output heating, in relation to the effective requirement of the system, therefore it does not need adjusting.
However, during the bringing onto stream of the system, the boiler runs for a brief period at its maximum power.
If one wishes to limit the maximum power to the effective maximum load necessary for the system, just operate on the P parameter found on the installers menu (see section 7.12).

The P parameter can be adjusted between 1 and 100, corresponding respectively to the minimum and maximum output . Read the correct parameter on the table on the left.

6.10 - Domestic hot water flow rate adjustment

The quantity of domestic hot water which can be produced from the boiler depends on the pressure of the hydraulic circuit. If the pressure is high, the water will move too quickly around the circuit without being heated. It is therefore advisable to carry out the following adjustments:

- switch on the boiler;
- adjust control “30” as shown in figure 1 at 48 - 50 °C;
- fully open a hot water cock. In the event of a mixer cock with single lever, the position must be on HOT;
- wait 5 minutes for the temperature to stabilize;
- if the water temperature is too low, reduce the water flow using the flow selector “A” (see figure 37) until reaching the desired temperature.

Water flow should generally be regulated according to the values given in section 9, under the heading “instant d.h.w. production dt 30°C”.

7.1 - Adjusting the domestic hot water

The adjustment of the domestic hot water temperature (when present) is carried out by turning the control “30” shown in figure 1. When the control is touched, the display “48” shown in figure 1 shows a blinking d and the temperature which is being set is shown. The setting field within which the domestic hot water can be set ranges from 45°C to 70°C.

7.2 - Adjusting the heating system

By means of the CH parameter present in the “Installers’ Menu” (see section 7.12) it is possible to select the various functioning modes of the heating service:

- CH = 00 “Thermostatic adjustment”: the heating supply temperature is adjusted manually, using control “31” as per figure 1. The opening and closing of the room thermostat correspondingly shuts down or starts up the boiler pump so as to carry out the adjustment of the room temperature;

- CH = 01 “Climatic adjustment”: the heating supply temperature is adjusted automatically by the outside temperature sensor according to an algorithm corresponding to figures 38 and 39. The opening and closing of the room thermostat correspondingly shuts down or starts up the boiler pump. When the “Calculated temperature” drops below the “Minimum heating temperature”, the heating service ends. It automatically starts up when the “Calculated temperature” once again rises above the “Minimum heating temperature”;

- CH = 02 “Climatic adjustment with room compensation”: the heating supply temperature is adjusted automatically by the outside temperature sensor according to an algorithm corresponding to figures 38 and 39. The opening of the room thermostat reduces the heating supply temperature by a set value. The boiler pump always remains working. When the “Calculated temperature” drops below the “Minimum heating temperature”, the heating service ends. It automatically starts up once again when the “Calculated temperature” once again rises above the “Minimum heating temperature”.

7.3 - Thermostatic adjustment

At the factory, the boiler is set with the CH parameter at 00, or rather the boiler provides hot water to the heating system, at a set temperature, set on control “31” as per figure 1. A room thermostat, if installed, acts directly on the internal pump of the boiler in order to adjust the heating of the rooms.
In order to fully exploit the boiler’s performances, it is advisable to set the temperature on control “31” at a value which is just sufficient so as to obtain the desired temperature of the rooms. If the season gets colder, progressively increase the value of the temperature set “31”. Proceed in the opposite manner, when the season gets milder.
This extremely simple functioning method, is suitable for the following types of system:
- small systems, with radiators, and with a room whose temperature is characteristic of all the other rooms;
- large systems, with radiators, where each zone is controlled by its own room thermostat and the boiler pump is shutdown only when all the room thermostats are satisfied (see to an appropriate electrical system).
- large systems with radiant panels (low temperature), where each zone is controlled by its own room thermostat and the boiler pump is shutdown only when all the room thermostats are satisfied (see to an appropriate electrical system).

CAUTION!!! If the appliance is installed in a low temperature system, it is indispensable to follow the settings indicated in section 5.6.

7.4 - Climatic adjustment

Via the “Installers’ Menu”, set parameter CH at 01. The heating supply temperature is adjusted automatically by the outside temperature sensor. The relationship existing between the outside temperature and the supply temperature, corresponds with the line illustrated in the diagrams shown in figures 30 and 31. In order to adjust this line to the various dwellings/climatic conditions, it is necessary to set all the adjustment parameters, according to the subsequent sections.

7.4.1 - Climatic adjustment: on which systems?

The “Climatic adjustment” is a more sophisticated and subtle setting of the “thermostatic adjustment” and it is able to use the performance of the boiler better and is suitable for the following types of systems:
- small systems, with radiators, and with a room whose temperature is characteristic of all the other rooms. The room thermostat takes steps to make opportune corrections to the room temperature, switching the boiler pump on and off.
- large systems, with radiators, where each zone is controlled by its own room thermostat and the boiler pump is shutdown only when all the room thermostats are satisfied (see to an appropriate electrical system).
- small systems, with radiant panels (low temperature), with a room whose temperature is characteristic of all the other rooms. The room thermostat takes steps to make opportune corrections to the room temperature, switching the boiler pump on and off. In the event of use of the time-programmable thermostat, it is necessary to consider that the radiant panel systems have an extremely high thermal inertia, therefore it is necessary to adapt any advances of the start up of the heating by also using the “Reaction” Cn parameter in order to speed up any “full operations” situation.
- large systems with radiant panels (low temperature), where each zone is controlled by its own room thermostat and the boiler pump is shutdown only when all the room thermostats are satisfied (see to an appropriate electrical system).

CAUTION!!! If the appliance is installed in a low temperature system, it is indispensable to follow the setting in section 5.6.

7.4.2 - Climatic adjustment: precautions when making adjustments

In order to carry out the correct automatic setting of the supply temperature, it is advisable to immediately set the values suggested further on, for the setting of the line of figures 30 and 31.Subsequently if these values do not provide a satisfactory result, proceed with the appropriate adjustments bearing in mind that:
- each parameter must be set in small degrees;
- after each change, wait at least 24 hours in order to see the result;
- the nearer the adjustment line draws to the real needs of the building, the more the heating of the building will be comfortable and the energy saving high;
- by means of control “31” in figure 1, it is however possible to carry out the small corrections “b” shown in figures 30 and 31, that is shift the parallelism of the line more or less in stages of 1 °C, up to 10°C.

7.4.3 - Climatic adjustment: setting of the parameters

By means of the user menu (see section 7.10), set:
- 0A = “The angle of the line”, which can be adjusted between 0.1 and 5.0. The suggested starting values are: 0.6 for “low temperature” systems; 1.6 for high temperature systems;
- 0b = “Minimum heating temperature”, which can be adjusted between 20°C and 60°C. The suggested starting values are: 30°C for “low temperature” systems; 40°C for “high temperature” systems;
- 0C =“Maximum heating temperature” which can be adjusted between 30°C and 80°C. The suggested starting values are: 45°C for “low temperature” systems”; 80°C for “high temperature” systems.

By means of the installer menu (see section 7.11), set:
- Cn = “Reaction” of the supply temperature with respect to the external temperature changes, which can be adjusted between 1°C and 10°C. A low “Reaction” value makes it possible to have a constant temperature of the dwelling but slow with regards reaching full running conditions and in its response to the external temperature changes. A high “Reaction” value guarantees the speed of reaching full running conditions, but also possible oscillations in the temperature inside the dwelling. You are advised to maintain this value between 1 and 2;
- br = “Fix point” is the heating supply temperature, when the external temperature is 20°C. It is called “Fix Point” because it is also the angle fulcrum of the line. The suggested starting values are: 33°C for “low temperature” systems 50°C for “high temperature” systems.

7.4.4 - Climatic adjustment: adjustments of the various climatic zones

The values previously suggested are for dwellings with an average insulation and for climatic areas where the external temperature for the calculation of the heat requirement is -5°C (by means of these figures, correspondence is obtained with the diagrams in figures 30 and 31). In the event that the climatic zone is different, adjust the gradient of the curve (parameter 0A), so as to obtain a supply temperature of 80°C (45°C in the event of “Low temperature” systems), when the external temperature is that of the calculation base for the heat requirement.

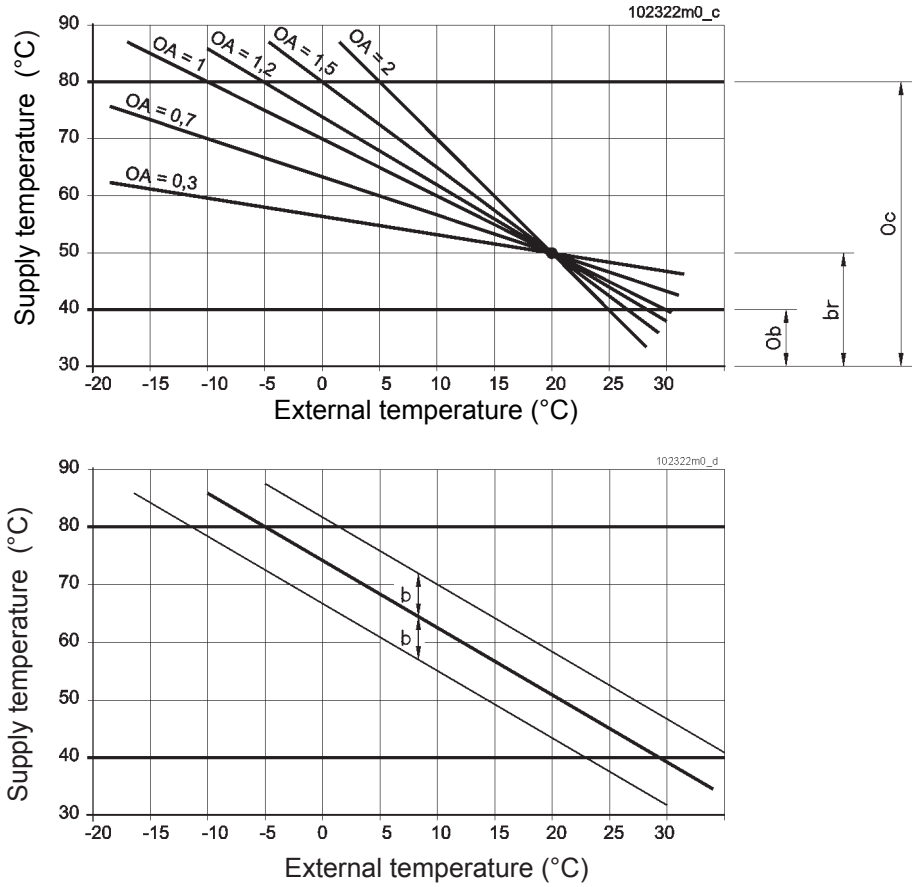
7.4.5 - Climatic adjustment: switching on and off the heating service

The climatic adjustment service is completely automatic, also with regards to switching off at the end of the season and subsequent switching on at the beginning of the season. The calculation algorithm envisages that, if the “Calculated temperature” is lower than the “Minimum heating temperature” (parameter 0b) the heating service switches off. When the “Calculated temperature” once again exceeds the “Minimum heating temperature” (parameter 0b), the heating service switches back on.
If the heating services switches off or comes on differently with respect to requirements, just use control “31” as per figure 1, in order to raise or lower the calculated temperature and match the “Minimum heating temperature” in advance or on a delayed basis.

7.4.6 - Climatic adjustment with room compensation

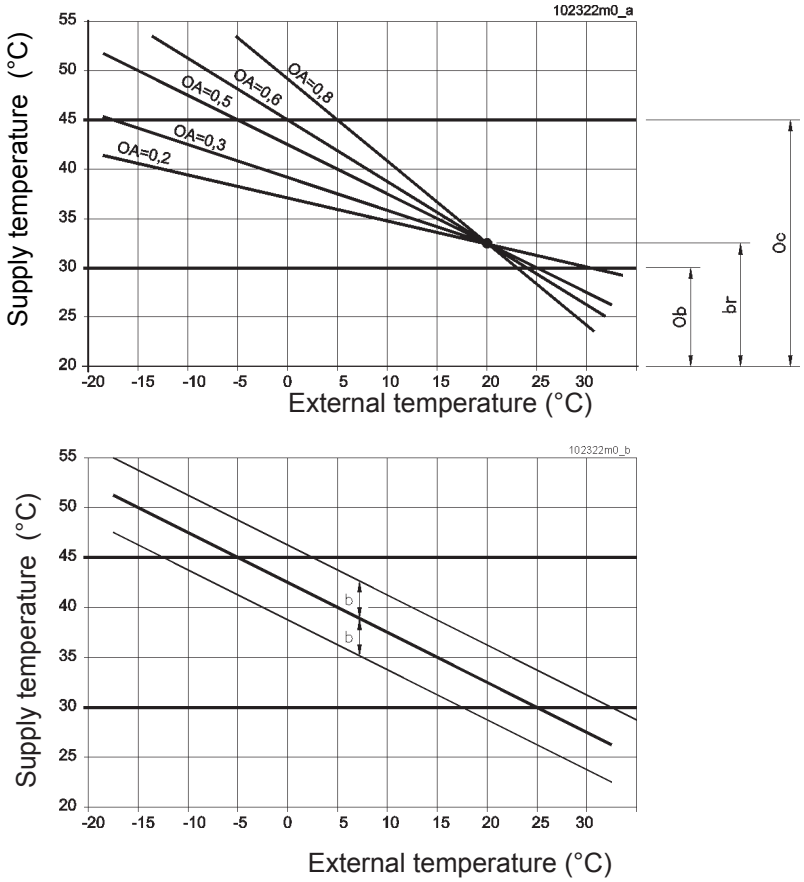
By means of the “Installers’ Menu” (see section 7.11) adjust the CH parameter to 02. Everything functions exactly as in the previous sections relating to “Climatic adjustment”, with the sole difference that now the boiler pump is permanently on. The opening of the room thermostat contact translates into a parallel movement downwards of the line as per figures 30 and 31. The opening of the room thermostat contact translates into a parallel movement downwards of the line as per figures 7.11). The tn parameter can adopt values ranging between 1°C and 20°C. The suggested values for this parameter are:
- 10°C for radiator systems (high temperature)
- 3°C for radiant panel systems (low temperature).
Values of this parameter which are too high may translate into instability of the room temperature. Too low values may make the action of the room thermostat uninfluential.

Climatic adjustment with room compensation can be used in all the cases envisaged by section 7.4.1 with the advantage that the on-going running of the pump manages to stabilize and standardize the room temperatures, especially in the event that certain loops of the heating system have hydraulic elements considerably greater than others.



OA = Inclination of the line
Ob = Minimum heating temperature
Oc = Maximum heating temperature
br = "Fix point" of the angle fulcrum of the line
b = parallel shift of the line (possible using the command on the panel)

Figure 38 - Graphs of the climatic adjustment for high temperature systems



OA = Inclination of the line
Ob = Minimum heating temperature
Oc = Maximum heating temperature
br = "Set point" of the angle fulcrum of the line
b = parallel shift of the line (possible using the command on the panel)

Figure 39 - Graphs of the climatic adjustment for low temperature systems

7.5 - Boiler settings (SWITCHES)

With just one control board (detail "13" of figure 1) it is possible to set the appliance in various different architectures. For this purpose, within the control board a series of electrical switches (see figure 21, detail "A") is envisaged, identified by the wording SWITCHES, whose positioning (ON or OFF) determines the type of functioning of the appliance.

CAUTION!!!

Changing these switches could cause the appliance and therefore the system to malfunction. For this reason, only a professionally qualified technician, who is sensitive to and has in-depth knowledge of the appliance and the functioning of the system, can change them.

JUMPERS	Position	Description
1	OFF	Appliance with production of instant D.H.W.
	ON	Appliance with production of D.H.W. via starage tank
2	OFF	Appliance with production of instant D.H.W.
	ON	Position not available for this series of appliances
3	OFF	Pressure switch for minimum heating pressure, inhibited
	ON	Pressure switch for minimum heating pressure, inserted
4	OFF	MWL brand fan
	ON	FIME brand fan
5	OFF	Combined boiler, heating and d.h.w.
	ON	Boiler for just heating
6	OFF	Heating service functioning between 30°C and 80°C (low temperature system)
	ON	Heating service functioning between 20°C and 45°C (high temperature system)
7	OFF	Appliance TYPE change service, inhibited
	ON	Appliance TYPE change service, enabled
8	OFF	Position not available for this series of appliances
	ON	Position not available for this series of appliances

7.6 - Timings of the various functions

In order to protect the life span of the appliance, improve the comfort generated, and increase energy saving, timings have been introduced during the functioning. These timings are:

- Post-circulation pump: each time the room thermostat determines a conclusion of the heating service, the pump continues to function for 3 minutes;
- Heating delay: each time the domestic hot water service finishes, there is a waiting time of 2 minutes before the re-activation of the heating service;
- Pumps and switch valve blockage protection: every 24 hours a forcing of the heating pump, the domestic hot water pump (if present) and the switch valve takes place;
- Protection against legionnaires disease; if the boiler is connected to a storage tank for the preparation of d.h.w., every seven days the latter is forced to a temperature of 60°C so as to carry out disinfection against legionnaires bacteria.
- Domestic alarm; if the appliance remains in continual domestic hot water service for longer than two hours, an "A1" alarm is generated.

7.7 - Pumps and switch valve blockage protection

During the Summer period, the circulator switches on once a day for around 15 seconds in order to avoid any incrustations blocking it. At the same time, the switch valve is activated for the same reason.

7.8 - Anti-freeze protection

CAUTION!!!

So that the anti-freeze protection is effective, it is necessary to leave the appliance connected to the electricity and gas mains and the two controls "30" and "31" as per figure 1, turned to the OFF position.

Once the boiler has reached a temperature of 7°C, the heating pump automatically comes on (and the domestic hot water pump if present). If the temperature falls further under 2°C, the burner also switches on, so as to protect the boiler from any problems deriving from freezing conditions.

If the boiler is not used for a long period of time (more than a year), we advise emptying it following the procedures indicated in sections 8.10 and 8.11.

7.9 - (Empty)

7.10 - Energy Saving

In order to reduce energy wastage generated by the display "48" as per figure 1, it is possible to switch it permanently off, with the exception of when it displays errors or settings. In order to switch it off, proceed as follows:

- access the "Installers' Menu" (see section 7.12);
- set the S parameter at a value other than zero, considering that each value will correspond with a delay in minutes until the display goes into Energy Saving mode.

7.11 - "Users' menu"

When entering the "Users' menu", the display "48" as per figure 1, starts to blink indicating to the user that a change of mode has taken place. In order to access the "Users' menu" just:

- press the Reset button for 2 seconds until the display starts to blinking;
- press and release the Reset button several times until the parameter desired is displayed;
- by means of the + or − keys, it is possible to change the value of the parameter.
- Press Reset in order to confirm the amended data and pass onto the next parameter.

Once you have reached the end of the menu, on the last Reset, the display stops blinking indicating exit from the menu.
If no key is pressed for more than 60 seconds, one automatically exists the menu. Any change in the parameters not confirmed using the Reset button, will be lost.
It is possible to change or consult the following parameters in this menu:

PARAMETER	DESCRIPTION	INFORMATION ON DISPLAY "48" of figure 1
0A	Adjustment of the gradient of the line as per figures 38 and 39 (visible only with climatic adjustment active. See section 7.2).	Setting range: 0,1-5,0
0b	Adjustment of "Minimum heating temperature" (visible only with climatic adjustment active. See section 7.2).	Setting range: see section 7.4.3
0c	Adjustment of Maximum heating temperature" (visible only with climatic adjustment active. See section 7.2).	Setting range: see section 7.4.3
b	Adjustment of the parallelism of the line as per figures 38 and 39 (visible only with climatic adjustment active. See section 7.2).	Only display. The regulation is carried out using the control "31" as per figure 1. It can adopt values ranging between -10°C and +10°C
c	Display of calculated heating temperature (if climatic adjustment active, see section 7.2) or display of temperature set via the control "31" as per figure 1.	Only display. It can adopt values ranging between 20°C and 80°C
d	Display of domestic hot water temperature set via the control "30" as per figure 1.	Only display. It can adopt values ranging between 40°C and 70°C (see also section 7.1)
E	Display of last error registered.	Only display. It can adopt the values indicated in section 7.13.2
L	Display of last block which occurred.	Only display. It can adopt the values indicated in section 7.13.1

7.12 - “Installers’ menu”

CAUTION!!!

Changing these parameters could cause the boiler and therefore the system to malfunction. For this reason, only a technician who is sensitive to and has in-depth knowledge of the appliance can change them.

The boiler’s micro-processor makes this menu of parameters available to the technician for the analysis of the functioning and adjustment of the appliance to the system.

When entering the “Installers’ Menu”, the display of the parameters “48” as per figure 1, blinking to indicate that a change of mode has occurred.

In order to access the “Installers’ Menu” just:

- keep the Reset button pressed down for 12 seconds until the U 1 parameter is displayed;
- continually press and release the Reset button to scroll through the list of the parameters;
- once the parameter has been displayed, it can be changed using the + or − keys;
- press and release the Reset button in order to confirm the amended data and pass onto the next parameter.
- once you have reached the end of the menu, on the last Reset, the display stops flashing indicating exit from the menu.

If no key is pressed for more than 60 seconds, one automatically exists the menu. Any change in the parameters not confirmed using the Reset button, will be lost.

It is possible to change or consult the following parameters in this menu:

7 - USE

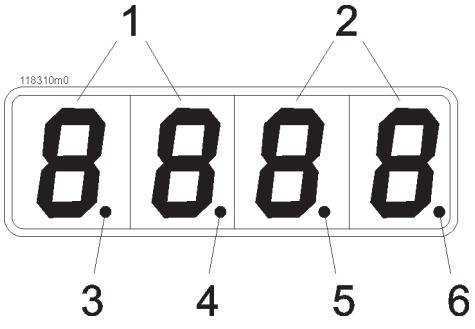
PARAMETER	DESCRIPTION	INFORMATION ON DISPLAY "48" OF FIGURE 1
U1	Boiler and heating supply temperature, gauged by NTC1 sensor	Value in °C (cannot be changed)
U2	Domestic hot water temperature, gauged by NTC2 sensor	Value in °C (cannot be changed)
U3	Domestic cold water (or storage tank) temperature, gauged by NTC3 sensor	Value in °C (cannot be changed)
U4	Outside temperature, gauged by NTC4 sensor	Value in °C (cannot be changed) (displayed only if climatic adjustment is active, as per section 7.2)
U5	Ionization current gauged	Value from 0 to 99 (at 30 it corresponds to a current of 1uA, at 99 it corresponds to a current of 5.5 uA) (cannot be changed)
U6	High limit temperature, gauged by NTC6 sensor	Value in °C (cannot be changed)
U7	Flue gas temperature, gauged by NTC7 sensor	Value in °C (cannot be changed)
tY	Type of basic setting of control board	Can be changed in accordance with the instructions indicated in the gas conversion kit
rt	Status of room thermostat contact	00 = contact open (heating service off) 01 = contact closed (heating service on)
F	Measurement of fan speed rotation	Value in g/1'/100 (rpm/100) (cannot be changed)
P	Power set for heating service	Adjustable according to the instructions of section 6.9
CH	Heating service functioning mode	Can be changed: 00 = thermostatic adjustment (see section 7.3); 01 = climatic adjustment (see section 7.4); 02 = climatic adjustment with room compensation (see section 7.4.6);
Cn	Reaction to external temperature changes	Can be changed from 1 to 10 (active only with climatic adjustment). See section 7.4.3 for its adjustment.
br	Angle fulcrum of climatic adjustment line	Can be changed from -9 to 65 (active only with climatic adjustment). See section 7.4.3 for its adjustment.
tn	Reduction of temperature generated by the opening of the room thermostat	Can be changed: from 1 to 20 (active only with climatic adjustment featuring room compensation) See section 7.4.6 for its adjustment.
L	Boiler knobs' status	Can be changed: 01 = knobs presents; 00 = knobs absent
S	Display "48" as per figure 1 energy saver	Can be changed: 00 = display always on; any other value, corresponds to a delay in the switching off of the display, expressed in minutes (also see section 7.10)
PS	Pump speed selector switch, for just the heating service	Can be changed: from 00 to 03 (the correspondence of the speeds of the pump with the value, can be seen in figures 6)

7.13 - Diagnostics

During the routine functioning of the appliance, the display "48" as per figure 1, continually shows the operating status of the appliance, via the following indications:

PARAMETER	DESCRIPTION	RIGHT-HAND DISPLAY
0	Boiler in stand-by mode or pause (no request for heating or domestic hot water)	Boiler temperature (°C)
P	Anti-freeze function active	Boiler temperature (°C)
A	Parameter not available for this boiler model.	Boiler temperature (°C)
FILL	CAUTION!!! system pressure too low, fill system (see section 6.1.3)	No display
d	Domestic hot water service on	Domestic hot water temperature (°C)
C	Heating service on	Heating temperature (°C)
L	Boiler in lock-out mode. To reset it, press the Reset button. If the lock-out occurs frequently, contact a professionally qualified technician.	Lock-out code (see section 7.12.1 for decoding). Error code (see section 7.12.2 for decoding).
E	Boiler fault. Contact a professionally qualified technician	Boiler temperature (°C)
F	Auto-purging procedure in progress (see section 6.5.1). It will end within 2 minutes	Storage tank temperature (°C)
AL	Anti-Legionnaires disease procedure in progress (see section 5.13.1). It will terminate when the water in the storage tank reaches a temperature of 60°C.	

DISPLAY (detail"48" of figure 1)



1 - Parameter display.
2 - Display of values adopted by parameters
3 - Indicator of burner status.
On = burner on;
Blinking = burner off.
4 - Indicator of domestic service status.
On = domestic service active;
Off = domestic service inactive.
5 - Indicator of decimal of displayed value.
6 - Indicator of heating service status.
On = heating active;
Off = heating inactive.

7.13.1 - Diagnostics: “L” lock-outs

“L” Code	Lock-out description	Controls	Solutions
L01	No flame detected after three subsequent ignition attempts	Check: Gas supply pressure (see section 6.6), sparks on ignitions electrodes (see section 8.5); correct pressure of comburant air (see section 6.7); 220Vac electricity supply to gas valve; electrical element of the two coils of the gas valve 0.88 Kohm and 6.59 Kohm	If the supply pressure is incorrect, it is necessary to take steps upstream from the appliance in order to restore it; if the comburant air pressure is incorrect, it is necessary to take steps on the venting system in order to eliminate any obstruction; if the current to the gas valve is not 230Vac it is necessary to replace the control and command board; if the electrical element of the gas valve is not 0.88 Kohm and 6.59 Kohm, the valve must be replaced.
		If the burner switches on and off at the end of the ignition attempt, check: that the ionization current is set at a value greater than 60 (follow procedure in section 8.8.4).	If the ionization current is not greater than 60, it is necessary to check the CO2 (see section 6.8) and restore the correct value, check the ionization electrode and if necessary replace it, check the integrity of the electrical circuits wires of the ionization current.
L02	Flame extinguishes three times	Check: that the ionization current is set at a value greater than 60 (follow procedure in section 8.8.4) If the ionization current is not	greater than 60, it is necessary to check the CO2 (see section 6.8) and restore the correct value, check the ionization electrode and if necessary replace it, check the integrity of the electrical circuits wires of the ionization current.
		Check: that the flue gas discharge is appropriately protected from obstructions caused by gusts of wind.	If the flue gas discharge is positioned on vertical walls, it is necessary to protect it with a wind-protection grill; if the flue gas discharge is positioned above the roof, check that it is not in a flow-back zone, and that any wind-protection chimneypot is really effective.
L03	Boiler temperature over 95°C.	Check that the pump is working	Restore the water circulation or replace the command and control board
L04	Gas valve command relay		Replace the command and control board
L05	Safety relay or earth inefficient	Check the earthing of the appliance	If the earth is good, replace the command and control board
L06	Flue gas sensor over 110°C	Check that the electrical element of the flue gas sensor complies with the graph in section 8.9; check the efficiency of the boiler, it must be over 96%	If the sensor does not comply with the correct values, replace it; if the boiler efficiency is less than 96% and the operating parameters are correct, it is necessary to replace the primary heat exchanger and place a filter at the entrance of the heating return connection.
L07	Electrical circuit of flue gas sensor interrupted	Check that the electrical element of the flue gas sensor complies with the graph in section 8.19;	If the sensor does not comply with the correct values, replace it;
L08	Spark generator relay		Replace the command and control board
L09	RAM memory		Replace the command and control board
L10	E2prom memory damaged		Replace the command and control board
L12	E2prom memory damaged		Replace the command and control board
L13	Programme error		Replace the command and control board
L14	Programme error		Replace the command and control board
L15	Programme error		Replace the command and control board
L16	Programme error		Replace the command and control board

"L" Code	Lock-out description	Controls	Solutions
L17	Temperature difference between NTC1 and NTC6	Check that the electrical element of the two sensors complies with the graph in section 8.9;	If one of the two or both sensors do not have the correct values, it is necessary to replace them;
L18	Programme error		Replace the command and control board
L19	Gas valve: flame sensed for 10 seconds after the closure of the valve		Replace gas valve
L20	Gas valve: flame sensed before opening of gas valve.		Replace gas valve
L25	NTC6 error sensor	Check that the electrical element of the sensor complies with the graph in section 8.9;	If the sensor is not within the correct values, it is necessary to replace it. Otherwise, it is necessary to replace the control board.
L32	Programme error		Replace the command and control board
L33	Fan rotation error	Check that it is powered at 300 Vdc.	If the fan is powered, it is necessary to replace it differently, replace the board.
L45	Heating circuit filling time longer than 10 minutes.	Check the pressure switch setting pressure, FILL must appear when the pressure drops below 0.6 bar; check that there are no water leaks from the heating system.	If the pressure switch is not correctly set, it must be replaced; if the system has a leak, it must be fixed.
L46	Filling of heating circuit repeated 16 times in 24 hours	Check the pressure switch setting pressure, FILL must appear when the pressure drops below 0.6 bar, and must disappear when the pressure rises above 1.5 bar; check that there are no water leaks from the heating system.	If the pressure switch is not correctly set, it must be replaced; if the system has a leak, it must be fixed.

7.13.2 - Diagnostics: "E" errors

"E" Code	Lock-out description	Controls	Solutions
E01	NTC1 boiler temperature sensor circuit interrupted.	Check that the electrical element of the sensor complies with the graph indicated in section 8.9; check the electrical connection cables between the probe and the command board	If the electrical element of the probe does not comply, it must be replaced; if the electrical circuit is damaged, it must be repaired; if the previous two cases do not apply, replace the command and control board
E02	NTC2 domestic hot water temperature sensor circuit interrupted.	Check that the electrical element of the sensor complies with the graph indicated in section 8.9; check the electrical connection cables between the probe and the command board	If the electrical element of the probe does not comply, it must be replaced; if the electrical circuit is damaged, it must be repaired; if the previous two cases do not apply, replace the command and control board
E07	NTC3 cold water temperature sensor circuit interrupted.	Check that the electrical element of the sensor complies with the graph indicated in section 8.9; check the electrical connection cables between the probe and the command board	If the electrical element of the probe does not comply, it must be replaced; if the electrical circuit is damaged, it must be repaired; if the previous two cases do not apply, replace the command and control board
E08	Circuito sensore temperatura caldaia NTC6, interrotto.	Check that the electrical element of the sensor complies with the graph indicated in section 8.9; check the electrical connection cables between the probe and the command board	If the electrical element of the probe does not comply, it must be replaced; if the electrical circuit is damaged, it must be repaired; if the previous two cases do not apply, replace the command and control board

"E" Code	Lock-out description	Controls	Solutions
E11	NTC1boiler temperature sensor circuit short-circuited.	Check that the electrical element of the sensor complies with the graph indicated in section 8.17; check the electrical connection cables between the probe and the command board	If the electrical element of the probe does not comply, it must be replaced; if the electrical circuit is damaged, it must be repaired; if the previous two cases do not apply, replace the command and control board
E12	NTC2 domestic hot water temperature sensor circuit short-circuited	Check that the electrical element of the sensor complies with the graph indicated in section 8.17; check the electrical connection cables between the probe and the command board	If the electrical element of the probe does not comply, it must be replaced; if the electrical circuit is damaged, it must be repaired; if the previous two cases do not apply, replace the command and control board
E13	Erroneous temperature reading.		Replace the command and control board
E14	Erroneous temperature reading.		Replace the command and control board
E15	Erroneous temperature reading.		Replace the command and control board
E16	Erroneous temperature reading.		Replace the command and control board
E17	NTC3 cold water temperature sensor circuit short-circuited	Check that the electrical element of the sensor complies with the graph indicated in section 8.17; check the electrical connection cables between the probe and the command board	If the electrical element of the probe does not comply, it must be replaced; if the electrical circuit is damaged, it must be repaired; if the previous two cases do not apply, replace the command and control board
E18	NTC6 boiler temperature sensor circuit short-circuited	Check that the electrical element of the sensor complies with the graph indicated in section 8.17; check the electrical connection cables between the probe and the command board	If the electrical element of the probe does not comply, it must be replaced; if the electrical circuit is damaged, it must be repaired; if the previous two cases do not apply, replace the command and control board
E19	E2prom memory damaged		Replace the command and control board
E20	Flame presence with gas valve closed		Replace the gas valve
E21	Phase and neutral inverted		Invert phase and neutral
E22	Mains frequency other than 50Hz	Check the electrical frequency of the system.	If the mains frequency is other than 50Hz, contact the electricity distribution company; if the mains frequency is 50Hz, replace the command and control board.
E23	No earth connection	Check the correct earthing of the system.	Restore the correct earthing of the system. If the earth correction is already sufficient, replace the command and control board.
E30	Erroneous temperature reading.		Replace the command and control board
E31	Erroneous temperature reading.		Replace the command and control board
E32	Erroneous temperature reading.		Replace the command and control board
E33	Erroneous temperature reading.		Replace the command and control board
E42	Programme error or earth connection insufficient	Check the correct earthing of the system.	Restore the correct earthing of the system. If the earth correction is already sufficient, replace the command and control board.
E50	Boiler TYPE selection error	Check the JUMPERS selector switch as per section 7.5.	If the selector switches are positioned correctly, replace the comand and control board
E51	Reset button pressed too often in a short period of time		

8 - MAINTENANCE

8.1 - General warnings

CAUTION!!! Maintenance operations must only be carried out on the boiler by qualified technicians.

CAUTION!!! Before any maintenance operations, disconnect the appliance from the electricity mains, using the appropriate switch nearby.

CAUTION!!! Before any maintenance operations, close the gas cock.

8.2 - Disassembling the casing and accessing internal components

In order to disassemble the casing, proceed as follows (refer to figure 32):

- unscrew screws “A”
- raise the fastener “C”;
- extract the casing outwards “D”;
- push tabs “F” downwards and accompany instrument panel “G” during its rotation towards the front;
- remove screws “H” in order to access the inside of the box of electrical connections;
- push tabs “E” laterally and extract the cover for accessing the inside of the electrical box;
- open the fastener “I”;
- draw cover “L” out, in order to access the inside of the combustion chamber;

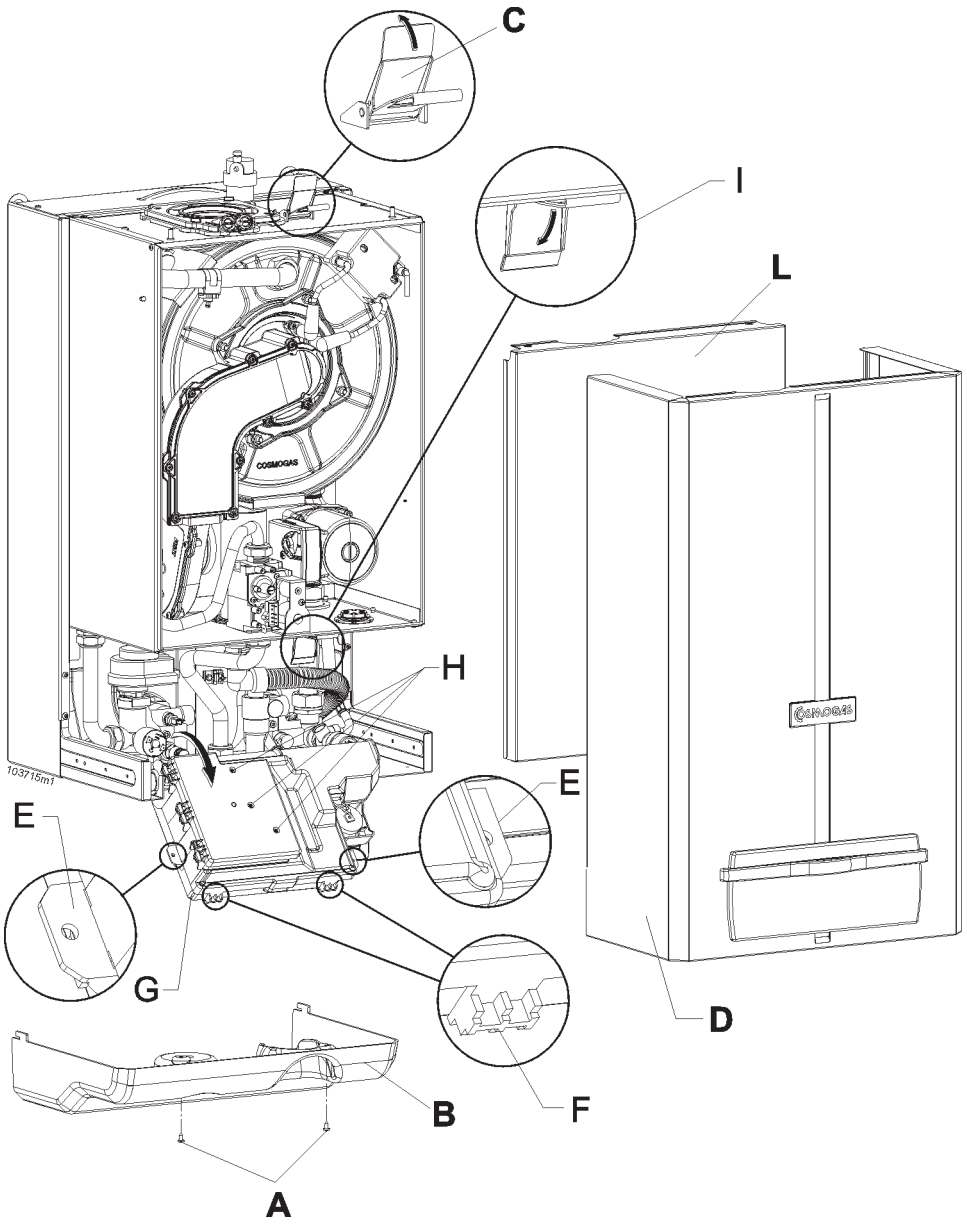


Figure 41 - Opening the control panel

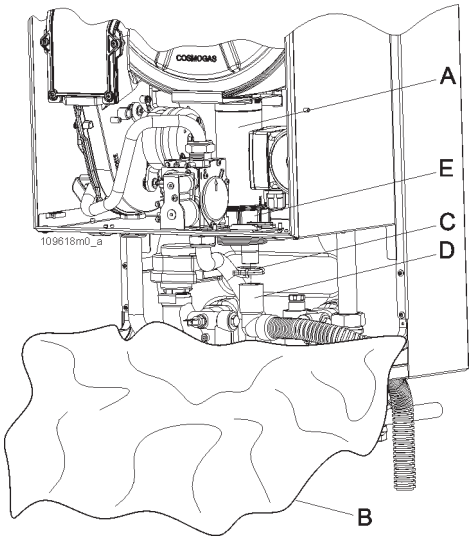


Figure 42 - Preparation for the extraction of the condensation collecting trap

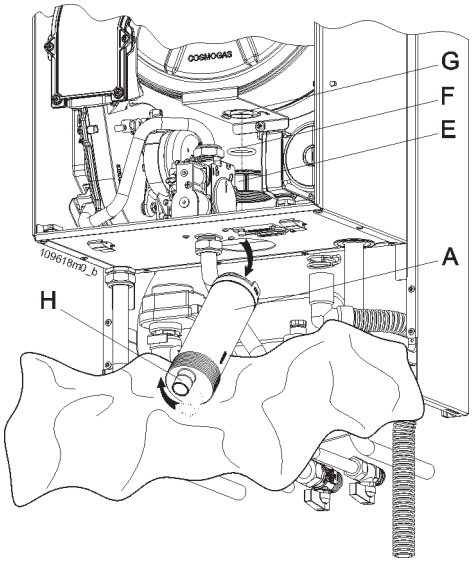


Figure 43 - Dismantling the condensation collecting trap

8.3 - Cleaning of the condensation collecting trap

In order to correctly clean the conveying and collection trap for the condensation produced by combustion, it is necessary to proceed as follows (refer to figures 42 and 43):

- force the domestic hot water service as described in section 8.15, with the aim of lowering the level of liquid present in the trap “A”;
- access the internal components following section 8.2;
- place a waterproof cover “B”, over the electrical panel, to avoid any drops of water entering the electrical system;
- loosen spring “C” with a pair of pliers, pushing in downwards;
- draw out the condensation tube “D” downwards;
- unscrew the nut “E”;
- pull out trap “A” downwards, taking care since it is full of condensation water and during the rotation outwards it could spill;
- open the trap and clean inside;
- re-assemble everything, proceeding in reverse order, taking care that gasket “F” is replaced in the specific housing;
- restore the level of liquid inside the trap pouring in 100 cm3 of water (a glassful) via the flue gas discharge or opening “H” as per Figure 44.

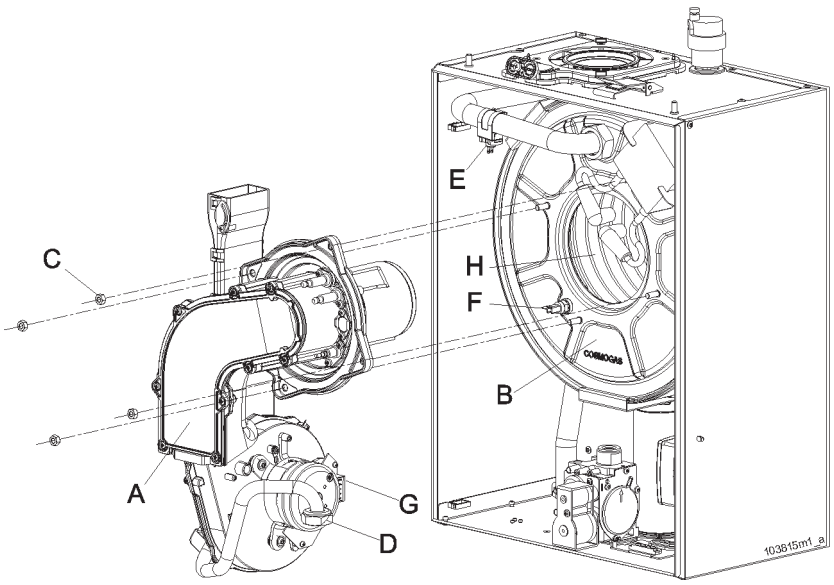


Figure 44 - Dismantling the fan-burner unit

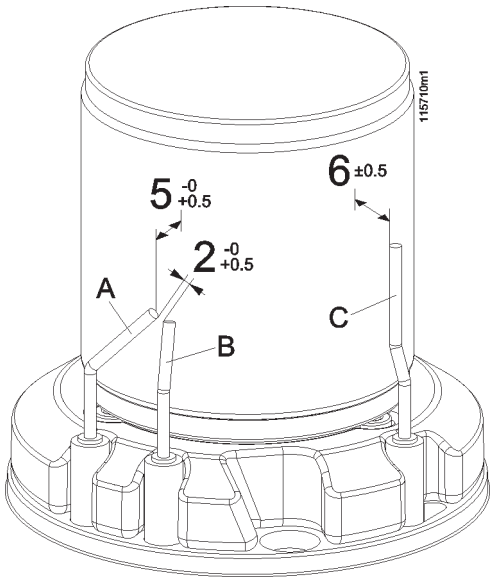


Figure 45 - Positioning of electrodes on burner

8.4 - Cleaning the burner and primary heat exchanger (flue gas side)

To correctly clean the burner and the heat exchanger (flue gas side), proceed as follows:

- access the internal components following instructions in section 8.2;
- unscrew bolt “D” as per figure 44;
- disconnect the wires from the ignition sparkplugs and the wire from the detection plug (see figure 1, details 42, 44 and 45);
- disconnect the wire from the safety sensor “F” as per figure 44;
- undo the four nuts “C” as per figure 44;
- extract the entire fan and burner unit, detail “A” as per figure 44;
- use a cylindrical brush, with plastic bristles, to clean the inside of the combustion chamber (detail “H” of figure 44);
- use a vacuum cleaner to remove any unburned residue from the combustion chamber (detail “H” of figure 44);
- using the same vacuum cleaner, clean the surfaces of the burner and around the electrodes;
- reassemble the components by proceeding in reverse order;
- open the gas cock;
- restore normal electrical power.
- check that there are no gas leaks between the removed joints.

8.5 - Correct positioning of the ignition and ionization electrodes

So that the appliance works satisfactorily, it is indispensable that the electrodes are positioned correctly (refer to figure 45):

- ☞ the distance between the ignition electrodes “A” and “B”, must be between 2,0 and 2,5 mm;
- ☞ the distance of the ignition electrodes from the surface area of the burner must be between 5 and 5.5 mm;
- ☞ the distance of the ionization electrode from the surface of the burner, must be between 6,0 and 6,5 mm.

8.6 - Secondary heat exchanger for the production of d.h.w.

The production of d.h.w. is delegated to the secondary heat exchanger (detail “37” of figure 1). If this exchanger, over time, is no longer efficient, it may be necessary to clean or replace it.

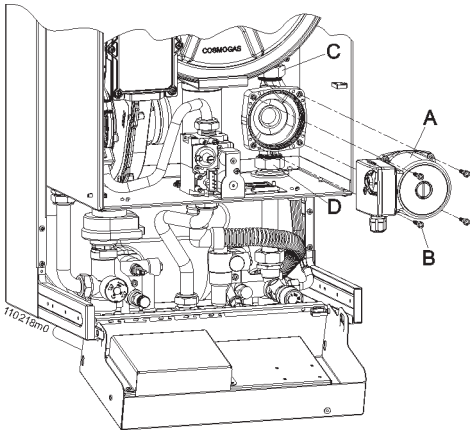


Figure 49 - Replacing the pump motor

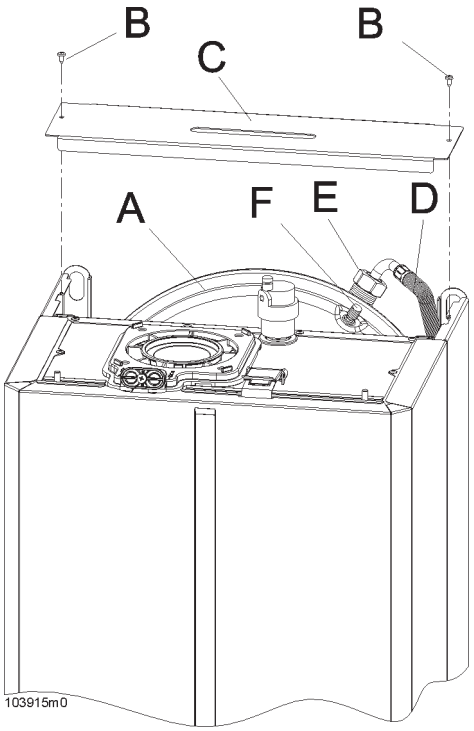


Figure 50 - Accessing the expansion tank

8.7 - Replacement of the pump motor

If it becomes necessary to replace the circulator pump, proceed as follows (refer to figure 49):

- empty the water from the heating circuit, following the procedure indicated in section 8.10;
- access the internal components of the appliance, following section 8.2;
- remove screws “B”;
- extract pump “A” outwards;
- disconnect the electrical wires from the pump unit.

8.8 - Checking the expansion tank

The expansion tank is positioned at the back of the boiler. In order to check the pressure or dismantle it, proceed as follows (refer to figure 50):

- dismantle the discharge pipe from fitting “2” as per figure 1;
- remove screws “B”;
- remove part “C”;
- with your hands, turn the expansion tank “A”, until valve “F” is in an accessible position;
- release the pressure from the heating circuit following the procedures in section 8.10;
- check the pre-filling pressure of the expansion tank. It must be 1 bar. If the pressure is lower, proceed to reinstate it, letting the water run out of the heating discharge cock (detail “11” of figure 1).

If the expansion tank needs to be replaced, proceed as follows:

- empty the heating circuit, following the procedure indicated in section 8.10;
- unscrew nut “E”;
- remove the expansion tank, drawing it out upwards.

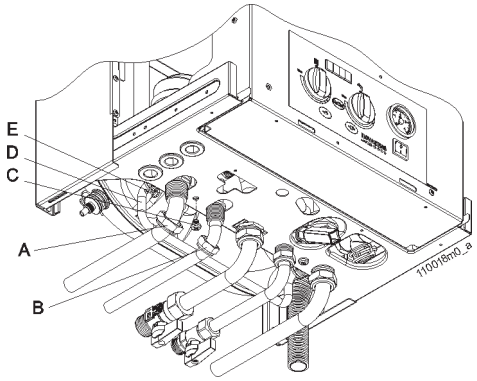


Figure 51 - Dismantling the supply and return fittings

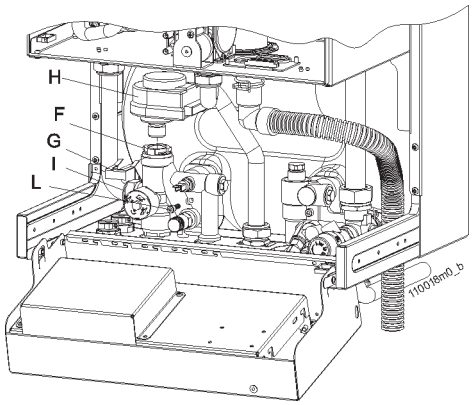


Figure 52 - Dismantling the 3-way valve servomotor

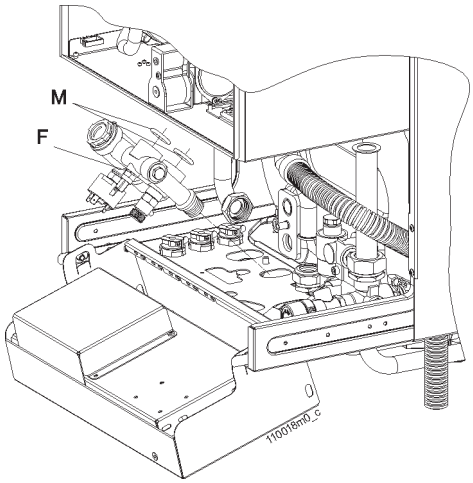


Figure 53 - Extracting the 3-way valve

8.9 - Dismantling the 3-way valve

The 3-way valve (detail “F” of figure 52) inverts the flow of water produced by the primary heat exchanger, to the heating circuit or the secondary heat exchanger for the production of d.h.w.. Should it become necessary to replace it, proceed as follows (refer to figures 51, 52 and 53):

- empty the water from the heating circuit, following the procedure indicated in section 8.10;
- access the internal components of the appliance, following section 8.2;
- disconnect the fittings “A” and “B”;
- unscrew screw “C”;
- remove spring “E” and extract the by-pass pipe “D” towards the back of the appliance;
- remove the fork “G”;
- extract the servomotor “H”;
- unscrew fitting “I”;
- unscrew screw “L”;
- extract the entire block of the 3-way valve “F” outwards taking care with the gaskets “M” (see figure 53);
- during reassembly, take care with the positioning of the gaskets “M”.

8.10 - Draining the heating side of the appliance

To empty the boiler from the heating side, proceed as follows:

- turn off the boiler;
- allow the water inside to cool by switching off the room thermostat and turning control “31” as per figure 1 to minimum. Wait until the display “48” as per figure 1 shows a temperature of at least 40°C;
- access the internal components following the procedure indicated in section 8.2;
- connect a flexible rubber hose to the discharge cock “A” (see figure 54) and place the other end in a sink plughole or similar;
- open discharge cock “A”;
- open the bleeding valves of the radiators. Begin with the upper radiators and continue with the lower ones;
- after draining out all the water, close the radiator bleed valves and discharge cock “A”;

CAUTION!!! Do not recover and/or re-use water drained from the heating circuit for any purpose as it could be contaminated.

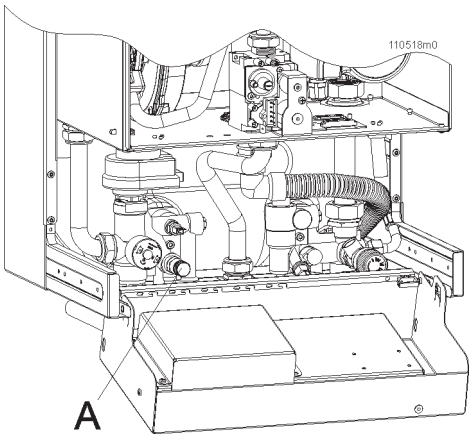


Figure 54 - Heating circuit discharge cock

8.11 - Draining the domestic side of the appliance

To empty the boiler from the domestic side, proceed as follows:

- close the main domestic cold water supply cock of the house;
- open all the hot and cold water cocks in the house;
- ensure that at least one of these is at a lower level than the boiler.

8.12 - Forcing

So as to carry out specific checks, dealt with case by case in the manual, it is possible to force the functioning of the appliance.

8.13 - Auto-purging

It is possible to re-set the auto-purging procedure, by pressing keys + and − together for 10 seconds, until the letter F appears on the display. Then press Reset.

8.14 - Fan

It is possible to generate the start-up of just the fan, by pressing keys + and − together for 10 seconds, until the letter F appears on the display. Now the fan will remain on for 10 minutes. In order to exit in advance from the forcing of the fan, press the Reset key.

8.15 - Minimum and maximum output

It is possible to force the functioning of the appliance to its minimum or maximum output, both during the heating service and during the domestic hot water service; proceed as follows:

- generate a request for the service you wish to force:
  - heating: switch on the room thermostat and turn control “31” of figure 1 to maximum;
  - domestic hot water: turn control “30” of figure 1 to maximum and fully open the hot water tap;
- by pressing keys + and − together for more than 10 seconds, until F appears on the display;
- press key + until the display shows:
  - t _ for forcing the heating to minimum output;
  - t for forcing the heating to maximum output;
  - S _ for forcing the domestic hot water to minimum output;
  - S for forcing the domestic hot water to maximum output;
- press the Reset key in order to restore the boiler to normal running conditions.

8.16 - Checking the ionization current

During the checks on the minimum and maximum output (see section 8.15), the display shows the letter of the service checked, t or S and at the same time, in the second part of the display, shows the value of the ionization current. At 30 it corresponds to a current of 1 uA, at 99 to a current of 5.5 uA. This value must always be greater than at least 60.

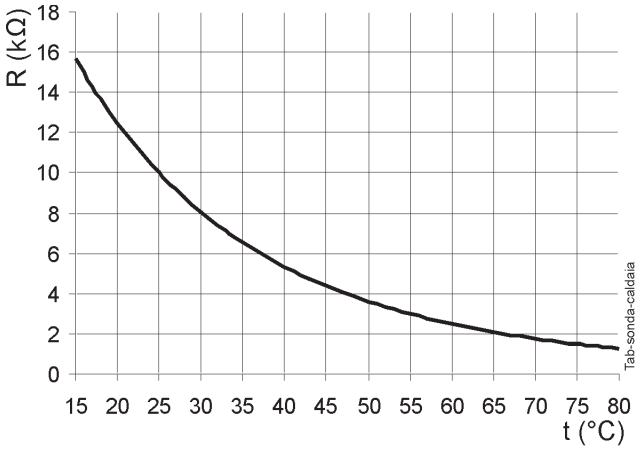


Figure 55 - Water sensors' curve

8.17 - Water temperature gauging sensor

A number of sensors, which gauge the temperature, are positioned on the boiler's heat exchanger. The electrical resistance existing between the two contacts of the sensor must correspond with the values shown in figure 55.
The temperature sensors are: NTC1; NTC2, NTC3, NTC5 and NTC6, whose positioning can be ascertained in figures 1, 57 and 58.

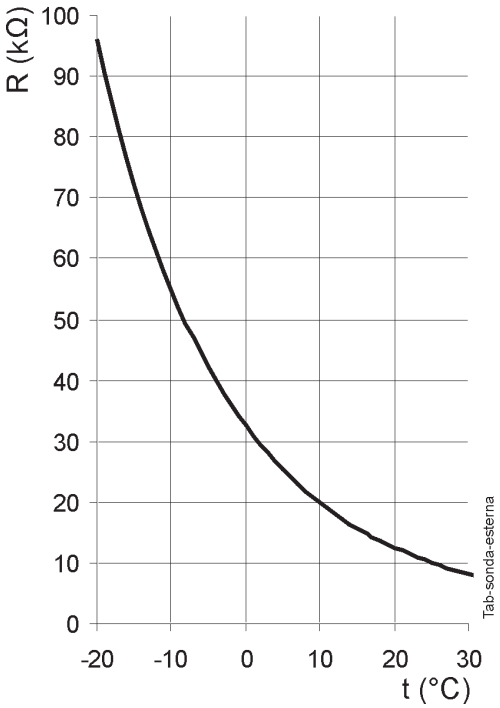
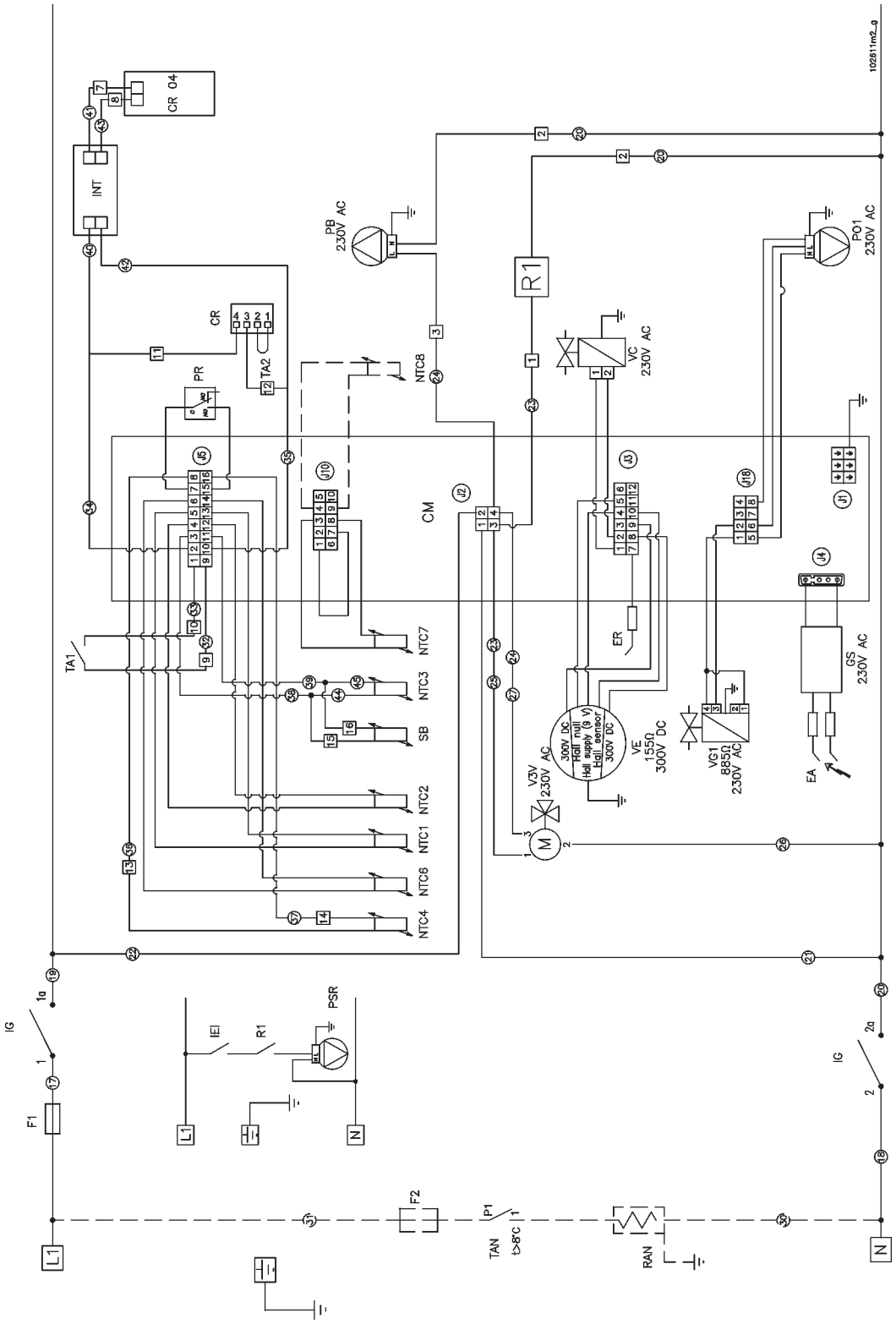


Figure 56 - Outside temperature sensor curve

8.18 - Outside temperature sensor

An outside temperature sensor can be connected to the boiler on request (see sections 7.2 and 7.4). The electrical resistance existing between the two contacts of the sensor must correspond with the values shown in figure 56.

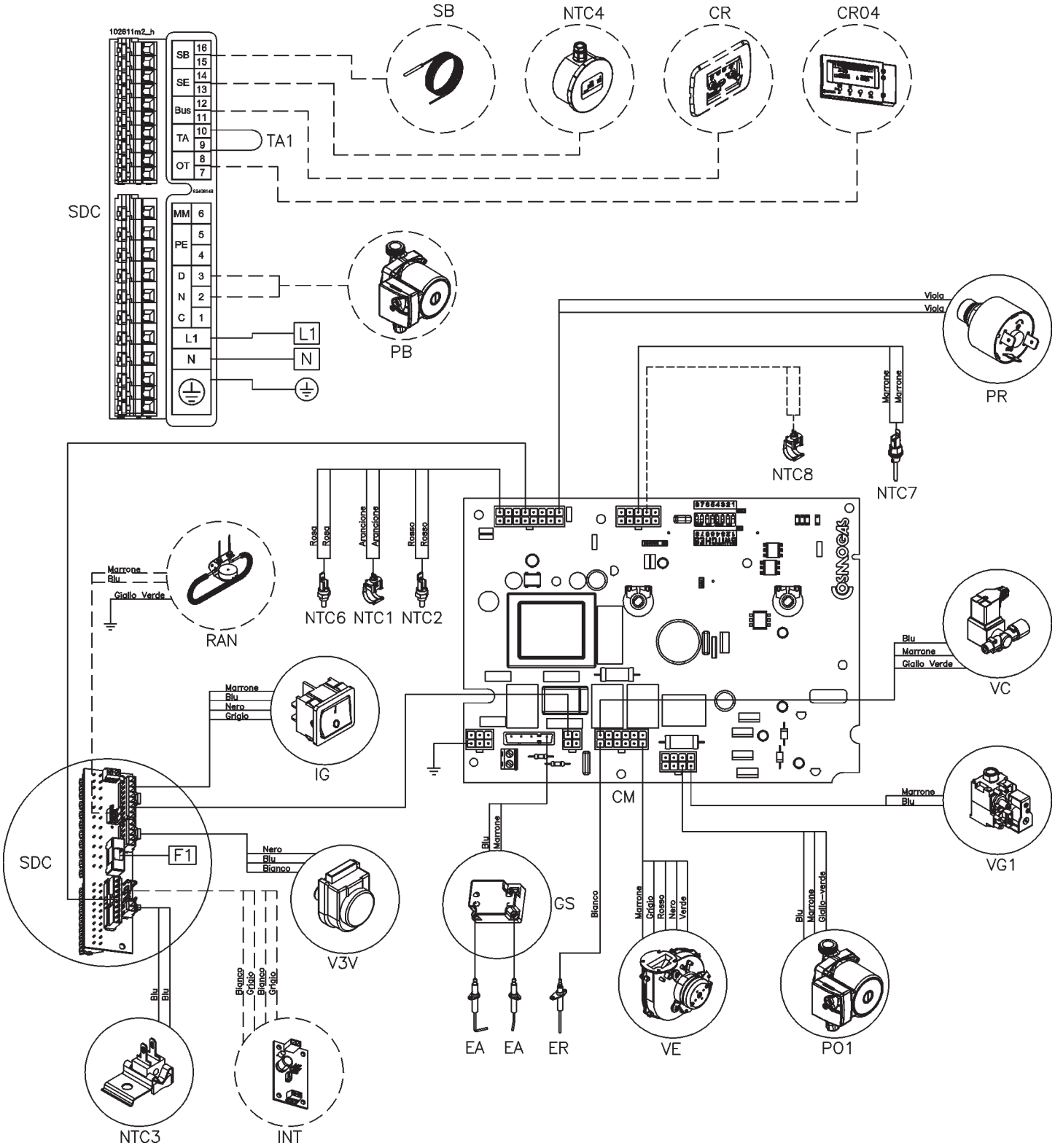
8.19 - Functional wiring diagram



CM - Command and control board
CR - Remote control (optional)
CR04 - Remote control (optional)
EA - Ignition electrode
ER - Detector electrode
F1 - Power supply fuse 1.6A
F2 - Storage tank pump fuse
GS - Spark generator
IG - On/off power switch
IEI - Summer/Winter switch
INT - Opentherm interface
J1 - 6-pole connector
J2 - 4-pole connector
J3 - 12-pole connector
J4 - 4-pole connector
J5 - 16-pole connector
J10 - 10-pole connector
J18 - 8-pole connector
NTC 1 - Boiler temperature sensor
NTC 2 - D.H.W. outlet sensor
NTC 3 - Domestic cold water inlet sensor or storage tank sensor
NTC 4 - Outside temperature sensor (optional)
NTC 6 - High temperature limit sensor
NTC 7 - Flue gas temperature sensor
NTC 8 - Return temperature sensor (optional)
PB - Storage tank pump (optional)
PO1 - Circulator pump
PR - Water pressure switch
PSR - Heating additional pump
R1 - Support relay for external pump (max 100 W)
RAN - Relais for antifreezing resistance
SB - Storage tank sensor (optional)
SDC - Connection board
TA1 - Room thermostat bridge inside the boiler
TA2 - Room thermostat bridge on remote control (optional)
TAN - no present in this model
V3V - 3-way valve
VC - Automatic charge valve
VE - Fan
VG - Gas valve

Figure 57 - Functional wiring diagram

8.20 - Multiwire wiring diagram



Key - see key to figure 57

Figure 58 - Multi-wire wiring diagram

9 - TECHNICAL FEATURES

MODEL			NOVADENS 24	NOVADENS 34
Country of destination			GB-IE	GB-IE
Type			C13;C33;C43;C53;C63;C83	
Category			II2H3P	II2H3P
EC type certificate (PIN)			0694BR1222	0694BR1222
Nominal input heat “Q”=		kW	25,0	34,8
Minimum input heat		kW	5,0	8,0
Nominal output heat (80/60) “P” =		kW	24,5	34,1
Nominal output heat (50/30) “P” =		kW	26,2	36,2
Efficiency at nominal output heat (80/60)		%	98	98
Efficiency at nominal output heat (50/30)		%	104	104
Minimum output heat (80/60)		kW	4,9	7,8
Minimum output heat (50/30)		kW	5,2	8,3
Efficiency at minimum output heat (80/60)		%	97	97
Efficiency at minimum output heat (50/30)		%	104	104
Efficiency at minimum output heat (37/30)		%	108,2	108,2
Certified efficiency (92/42/CEE)		stars	★★★★	★★★★
Chimney loss with burner on (80/60)		%	1,5	1,5
Chimney loss with burner off		%	0,2	0,2
Casing loss with burner on		%	0,5	0,5
Casing loss with burner off		%	0,1	0,1
Gas flow rate	Natural gas	m^3/h	2,64	3,68
	LP Gas	Kg/h	1,94	2,70
Gas supply pressure (mbar)	Natural gas	mbar	20	20
	LP Gas	mbar	30	30
Minimum gas supply pressure (mbar)	Natural gas	mbar	15	15
	LP Gas	mbar	25	25
Maximum gas supply pressure (mbar)	Natural gas	mbar	27	27
	LP Gas	mbar	45	45
Comburant air pressure	Natural gas	mbar	6,6	4,4
	LP Gas	mbar	6,6	3,8
Water capacity of the primary heat exchanger		lt	2	2
Weight of primary heat exchanger		kg	11	11
Water capacity of the secondary heat exchanger		lt	10	10
Weight of secondary heat exchanger		kg	5	5
D.h.w. output heat		kW	24,5	34,1
D.h.w. production with semi-accumulation in first 10 min (dt 30°C)		l	125	172
Instant d.h.w production (dt 30°C)		l/min	11,7	16,3
Design temperature		°C	95	95
Maximum heating temperature		°C	80	80
Minimum heating temperature		°C	20	20
Maximum heating pressure “PMS” =		bar	3	3
Minimum heating pressure		bar	1	1
Maximum pressure of domestic hot water circuit		bar	7	7
Minimum pressure of domestic hot water circuit		bar	0,05	0,05
Capacity of expansion tank		lt	10	10
Nominal power supply voltage		V	230	230
Nominal power supply frequency		Hz	50	50
Absorbed electric power		W	105	105
Degree of electrical protection			IP 20	IP 20
Flue gas pipes diameter (split)		mm	80 or 60	80 or 60
Max. length flue gas pipes (split)(80)		m	40	25
Max. length flue gas pipes (split)(60)		m	15	10
Flue gas pipes diameter (coaxial)		mm	60/100	60/100
Max. length flue gas pipes (coaxial)		m	3,7	3,7
Equivalent length of one elbow		m	45° elbow = 0.5m, 90° elbow = 1m	
CO (0% O2 with natural gas)		ppm	10	20
NOx (0% O2 with natural gas) (class 5 EN 483 and EN 297)		ppm	9	17
CO2 (%)		Natural gas	8,7/9,0	8,7/9,0
		LP gas	10/10,5	10/10,5
Maximum flue gas temperature		°C	90	90
Flue gas mass flow		Kg/h	42,3	59
Head available at discharge		Pa	60	60
Maximum condensation flow rate		l/h	3,84	5,57
Average degree of acidity of condensation		PH	4	4
Boiler weight		kg	50	50

10 - EC COMPLIANCE DECLARATION

The undersigned company **COSMOGAS S.r.L.**, with registered offices in Via L. Da Vinci 16 - 47014 Meldola (FC) ITALY,

DECLARES

under its own exclusive liability that the product:

WARRANTY No	
GAS BOILER MODEL	
MANUFACTURE DATE	

forming the subject matter of this declaration, is compliant with the model described in the CE type Examination Certificate, with reference to the table headed “EC type certificate (PIN)” in section 9 and in accordance with the provisions of the following Directives: Gas Appliances, (**90/396/EEC**), Efficiencies, (**92/42/EEC**), Low Voltage, (**2006/95/EC**), Electromagnetic Compatibility, (**2004/108/EEC**).

(The warranty number matches the serial number)

This declaration is issued in accordance with that established by said Directives.

Meldola (FC) ITALY, (Date of manufacture).

COSMOGAS s.r.l.
Via L. da Vinci 16 - 47014
MELDOLA (FC) ITALY
info@cosmogas.com
www.cosmogas.com